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Subterranea

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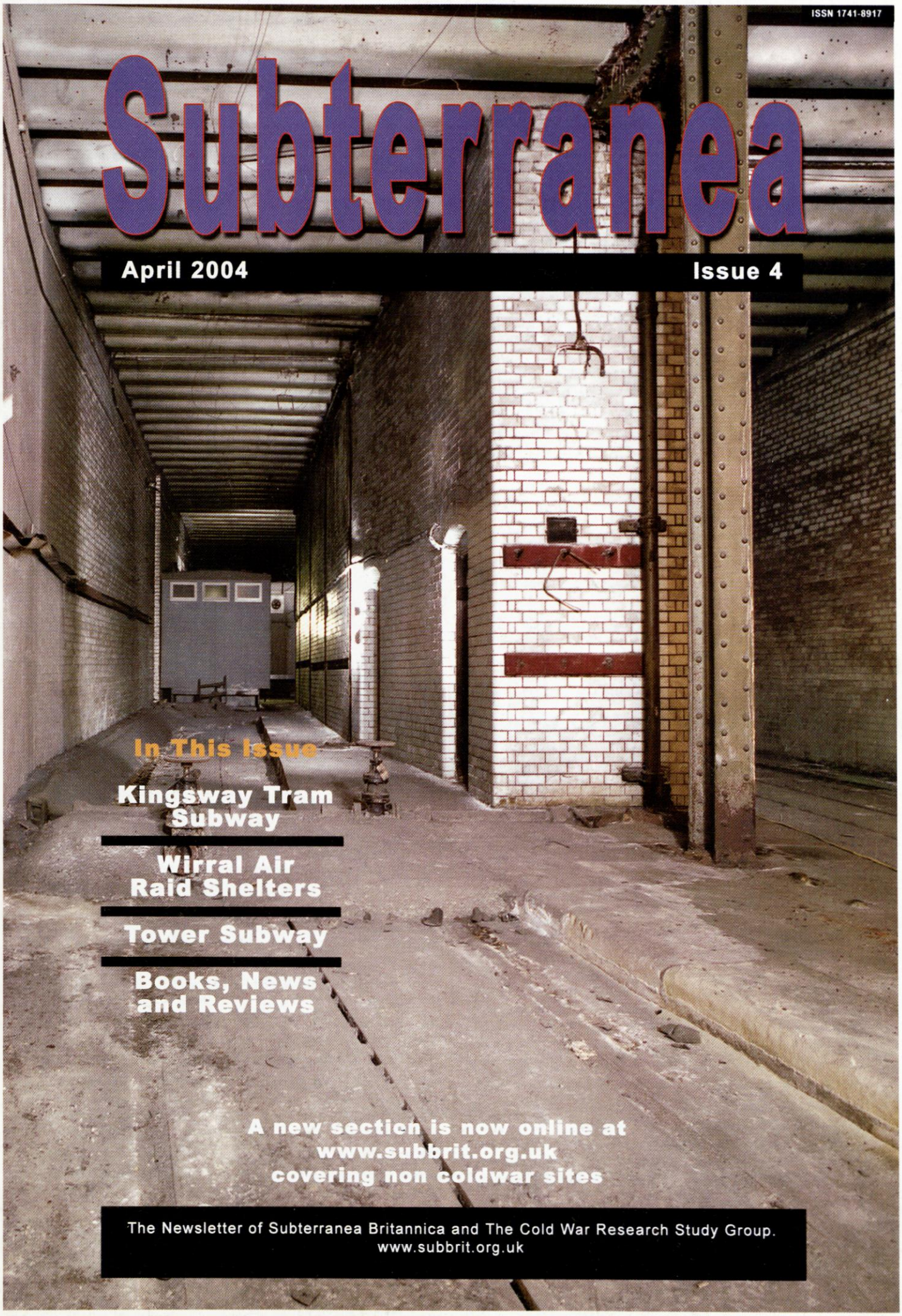

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Wirral Air Raid Shelters

Tower Subway

Books, News and Reviews

A new section is now online at www.subbrit.org.uk covering non coldwar sites

The Newsletter of Subterranea Britannica and The Cold War Research Study Group.
www.subbrit.org.uk

Subterranea Britannica is a society devoted to the study of man-made and man-used, underground structures and the archaeology of the Cold War. The main focus of interest is on abandoned and forgotten structures and, in the case of Cold War structures, studies are entirely confined to declassified and decommissioned structures.
The society is open to all and its membership includes all walks of life. Members are invited to contribute to this newsletter even if this just means sending very welcome snippets from newspapers and magazines.

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Newsletters of Subterranea Britannica are published by the committee of Subterranea Britannica. Original articles , book reviews, press cuttings, extracts from books and journals, letters to the editor etc. are welcome. However the editor reserves the right not to publish material without giving a reason.
The committee of Subterranea Britannica and the editor do not necessarily agree with any views expressed and cannot check the accuracy of any material sent in.

News

Derbyshire Lathkill Dale mines site to open to public

English Heritage is to open the former home of James Bateman, agent for the Lathkill Dale Mines in the 1830s, to the public. The mines were wound down from 1842 onwards, and ceased production in 1847. Below the derelict house, which is to be preserved as a ruin, is a shaft and tunnel, thought to have been the location of a novel water-powered mine pumping engine. It has been suggested that Bateman had this constructed below the house as a measure to avoid industrial espionage.

[From the English Heritage magazine Heritage Today, March 2004, 44 - 47]

Cheshire Winsford rock salt mine to be used for storage of hazardous waste

A small part (about eight per cent of the worked out area) of England's only working rock salt mine, at Winsford, is to be used for the disposal of an estimated 100,000 tonnes of hazardous waste per annum. This will include heavy metal residues from incinerated waste, but will not include biodegradable or radioactive waste.

[From Planning Magazine, 16 February 2004, and Newsletter Chelsea Spelaeological Society 46(2), page 29 (2004)]

An explosion in Docklands - culprits in court

There was an explosion in London's Docklands at 4.45 am on 23 February, 1998, resulting in a crater 22 metres wide and seven metres deep. Fortunately, at this early hour, few people were out and about, and the crater formed in the grounds of the George Green School.

This was not a terrorist attack, but a serious error in civil engineering.

The Docklands Light Railway was during 1998 being extended southwards from Mudchute Station under the river Thames to Greenwich and Lewisham. This line is of course now completed, but few of those travelling on it are aware of passing through the site of a major explosion.

As a new (yet another!) Thames tunnel was required, tunnel boring in the subsoil below the water was being carried out under compressed air. Careful control of the increased air pressure within a sealed off length of the tunnel in progress is intended to balance the surrounding ground water pressure, and thus keep the water out. This has long been standard civil engineering practice in tunnelling waterlogged ground.

Unfortunately, early that morning, the air over-pressure in the tunnel was evidently not sufficiently carefully controlled, and a hole was blown to surface in the school grounds. It was of course extremely fortunate that this event happened under dry land, not under the river, and that the crater formed in deserted school grounds in the small hours, not in a busy street.

The contractors responsible, Nishimatsu, appeared in court in January 2004, and pleaded guilty to a charge of 'failing to ensure the safety of people it does not employ.' The judge described the event as the result of an 'elementary error, indeed a blunder' and fined the firm £ 700,000 for a breach of the Health & Safety at Work Act. With the addition of prosecution and defence costs, the penalty amounted in total to £ 1m.

Source: New Civil Engineer, 22 January 2004, pages 8 - 9.

Camden Town crossover may be abandoned

Tube train services on London Underground's Northern Line were severely disrupted in October 2003 when a faulty points switch blade caused the derailment of a passenger-carrying train in the tunnel south of Camden Town Station.

The Northern line, both northbound and southbound from Camden Town divides into two branches. The branches on the north side are from Edgware and High Barnet. Those to the south serve the lines through Bank and Charing Cross. The purpose of the crossover was to allow any train, northbound or southbound, to be routed to either branch. Since the derailment, the crossover has been taken out of action, with the result that trains from Edgware can only go onto the Bank branch. And trains from High Barnet are restricted to the Charing Cross route.

It appears that redesigning the crossover may only be possible by enlarging the tunnel at this point.

Source: New Civil Engineer, 29 January 2004, page 10.

Emergency fire refuges to be installed under the Queensway road tunnel (Birkenhead - Liverpool)

The first major tunnel under the Mersey was the Mersey Rail tunnel (2,700 yards), made 1879 - 86 and still in intensive use, now carrying electric suburban trains to and from the Wirrall.

There was no road tunnel until the building of the Queensway tunnel (3.6 km) a four-lane single-bore tunnel made 1925 to 1934, followed by a second, the Kingsway twin-bore tunnel (2.24 km) opened in 1971.

Several disastrous road tunnel fires in mainland Europe have resulted in a re-appraisal of UK road tunnels, especially the older ones in which both lanes of traffic share a single bore, as is the case with Queensway. The Mont Blanc road tunnel fire in 1999 resulted in 39 deaths underground between France and Italy. Modern safety requirements are that persons trapped by a tunnel fire should have an escape route, usually via fireproof doors to a parallel bore. The twin-bore Kingsway tunnel was provided with three newly excavated emergency escape tunnels, linking the bores, completed at a cost of £ 2m in 2002.

There are now plans to make Queensway safer.

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Although both lanes of traffic share a single large-diameter bore, there is fortunately a solution to the problem ready to hand. The tunnel as built is divided horizontally, with almost half the available space below the road deck. This large space was originally intended to carry tram lines under the river, although these were never laid. Members attending the Subterranea Britannica Liverpool Study Weekend were able to visit this impressive space, which has only ever been used as the air intake for ventilating the tunnel.

The new proposal is to create seven emergency fire-proof refuges, each large enough to hold 140 people, below the road deck, at intervals of 200 metres. Provision of the total emergency accommodation for 980 persons is estimated to be likely to cost £ 7m.

The refuges will have video-telephones for contact with the emergency services. In the worst-case scenario, those who have taken shelter in the refuges will be able to walk out of the tunnel (anything up to a mile to walk) below the road deck. However, the operator, Mersey Tunnels, does not expect the refuges to be used, as no lorries (some of which might be carrying flammable loads) are allowed into the tunnel. The only vehicles over 3.5 tonnes allowed in are buses.

Source: New Civil Engineer, 21/28 August 2003, page 10.

Another mine in Surrey declared a Scheduled Ancient Monument

The silver sand mines underneath Reigate Castle were scheduled, perhaps by accident, along with the Norman earthworks in (I think) the 1930s. It seems possible that the then scheduling authority was not aware of the mines underneath. English Heritage has recently confirmed that the scheduling includes all the man-made cavities below the site, and in the last year I have twice applied for and obtained Scheduled Monument Consent for excavation of sections of the mine floor.

On 24 February 2004 the number of mines Scheduled as Ancient Monuments in Surrey was doubled, with the Secretary of State for Culture, Media and Sport authorising the Scheduling of the Brockham Lime Works, lime kilns, and hearthstone mine, as SAM 22780. This recognition of this site's national importance has been the culmination of 40 years of research by Subterranea Britannica' Chair, Paul Sowan, who has located surviving records of the Brockham Brick Company Ltd, and of the Brockham Lime and Hearthstone Company Ltd, and arranged for their safekeeping in the Surrey History Centre (formerly Surrey Records Office), and conducted intensive research in archives and libraries as well as on site. He has attended numerous site meetings, in the last two or three years, with English Heritage and Surrey Wildlife Trust officers, recording archaeological features and advising contractors for the SWT who have been modifying the lime kilns as secure winter hibernation sites for bats.

The part of the mine Scheduled is the open shaft (about 70 feet deep) and those parts of the underground workings falling within and below the Scheduled area. There is no access from the shaft bottom into the workings, as the tunnel at this point is blocked in both directions by roof-falls. After prolonged winter rain, the shaft-bottom is at times flooded, and the brickwork of the lower end of the shaft is in an unsafe condition. At least one other (filled) shaft and three (sealed) drift entrances are known for this mine, all of them outside the Scheduled area.

The mine dates from about 1881, and worked (with a short period of a few years closure around 1900) until 1925. The hearthstone raised, a mineral pigment, was used for whitening domestic stone hearths, flagstone floors, and doorsteps.

Source: Paul W Sowan

Britons trapped in Mexican caves

CUETZALAN, Mexico - Six British armed forces cave explorers have been trapped underground for five days in central Mexico, but are not in imminent danger, the Ministry of Defence has said.

The six were trapped by an unexpected rainstorm during a combined services caving expedition last week in caverns near the coffee-growing town of Cuetzalan, 110 miles (175 km) northeast of Mexico City.

They had rejected help from Mexican rescuers and were waiting for the waters to recede. The incident was not made public until Tuesday.

"They are all experienced cavers and nobody is in imminent danger, they are all a bit bored but well," ministry spokeswoman Gemma Blackburn told Reuters in a telephone interview on Tuesday.

But she said specialist Navy cave divers were on their way from Britain in case they were needed to dive into the cavern to rescue the servicemen.

"Several inches of un-forecast rain fell, flooding a low-lying section of the cave. They are in an area that has never flooded, it is stocked with food, sleeping bags, a first aid kit and a cave radio," she said.

Mexican Civil Protection rescue workers said other British cavers were in touch with their trapped colleagues from the surface via radio telephone.

The trapped armed forces personnel were all members of the Combined Services Caving Association taking part in an exercise called Cuetzalan Tiger.

The network of underground galleries near Cuetzalan is one of the most extensive in Latin America. It was first explored in the 1970s by British cavers, who

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have surveyed more than 60 miles (100 km) of passageways to date. A speleological Web site said the Cuetzalan region cave systems risked "serious threat" from flash floods.
Jose Ignacio Macias, spokesman for the Civil Protection Agency in Puebla state, where Cuetzalan is located, said strong currents underground were keeping the cavers from leaving. Puebla state officials had said the cavers became trapped after part of the cave collapsed

Source: Manuel Carrillo (Reuters)

Greenham Common

MOVIE stars could become regular visitors to West Berkshire if an idea to transform the former cruise missile silos at Greenham Common into a film studio is realised.
The Newbury Weekly News has learned that the silos' owners want to transform the 74 acre site into a film production studio and World War II air museum, but first need the approval of English Heritage. Vintage aircraft restorers Flying A Services bought the GAMA site from the Ministry of Defence last August for £317,500 It submitted its first planning application to West Berkshire Council this week to redevelop the silos' base and asking for permission to use the silos for storage.
In an accompanying statement, the applicant's agent Christopher Strang Associates said that its client's intended to manage the site as a "Flying 40s Air Museum, use for filming activities and long term storage uses", but has only sought permission for storage at this stage. "Our client has had continuing discussions with various broadcasting and filming companies," the statement added. The aviation museum would be open to the public and would accommodate Second World War aircraft. Storage will allow income to be generated while negotiations continue between Essex based Flying A Services, West Berkshire Council and English Heritage over its future development and to continue the extensive cleaning up operations.
Any major development must be approved by the Secretary of State for Culture, Media and Sport.
However, the backlog of cases the heritage watchdog must scrutinise means that it has been unable fully to discuss the plans. A spokesman for Flying A Services said: "Sadly, the site was listed as an ancient monument only after a great deal of damage, was done by vandals. "They seem to have destroyed everything they could practically lay their hands on.
"We are very happy to have acquired this interesting and Historic site and we hope the locals understand we have the best interests of the site at heart A spokesman for English Heritage said "We have been working with the owner and have had long discussions with him about what he wants to do with the site. "If he does decide to put in a formal proposal we would work on it immediately"

Source: Newbury Weekly News

Mercedes bunkers down

Daimler Chrysler has built a high security complex 800ft underground in a former Nazi-built cave system to protect company information from everything from earthquakes and floods to hackers and terrorist attacks. The main office at Kapfenberg in Austria is at ground level and looks like a giant golf ball. The underground facilities are protected by blast-proof, airtight, watertight doors. The company has installs so-called security cells at the site, which is connected to the outside world by ultra-secure computer connections and two power lines. In an emergency, a pair of diesel generators can take over the power supply. Stored in the centre are everything from top secret technical plans and business data to confidential customer data. The centre provides a variety of services to the car giant, from data storage to firewall and monitoring services. The complex, created by DCCG, a Daimler Chrysler subsidiary, is so safe the firm has accepted requests from other companies, including Munich's MTU Aero Engines, to look after their data.

Source: BBC News

New Uses for Alpine Fortresses

Summary of an article in the German Frankfurter Allgemeine Zeitung from 27 November 2004:
The outer bunkers of the former artillery fortification in Heldsberg in the lower reaches of the Rhein valley in Sankt Gallen (Switzerland) are gradually disappearing under vegetation. A kilometre long tunnel, which was driven into the rock face on the Austrian border by the Swiss general staff in 1938, was equipped with artillery pieces and heavy machine guns. To the front, anti-tank and anti-personnel obstacles were set up to hinder the enemy's advance in order to gain time so that general mobilisation could be proclaimed. But in 1993 the Swiss army withdrew, and Nature is now reclaiming her own.Heldsberg was the biggest and most up to date fortification of its time, with its own hospital and water and electrical supply. 600 soldiers moved in following its completion in 1941 and, until the Germans capitulated, the fortification played a key role in Switzerland's defence, which stretched from Sargans (Sankt Gallen) to Martigny (Valais, aka Wallis). Based on the concept developed by General Henri Guisan, the CinC of the Swiss army, an underground world was built alongside the Alps and in the rear of the country from 1936 onwards for the military and the government. The roads, railways, hospitals, accommodation and food and munitions stores are still to be found today. In the Gotthard

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massif, for example, the Fuchsegg tunnel system stretches over 40 km in length. After WW2, the bunker system became part of the Swiss defence against the Soviet Union, and further nuclear-proof bunkers were built. By the time the iron curtain fell, there were over 20,000 facilities in the complete system. Since then, numerous bunkers have been sold off, with the larger fortifications, however, remaining in the state's hands. Many of the facilities cannot be easily sold as they are no longer connected to the water or power supply system, and applications for planning permission are nearly always turned down. Instead, farmers, mushroom growers and wine growers make up most of the new users. Some have been turned into museums, for example at the Tessin Forte Airolo with its collection of artillery pieces. The Heldsberg museum shows life as it was in the fortifications. In Vitznau on the Vierwaldstaettersee the former alpine fortification is now a hotel.

Source: Mike Barton

Spain - Morocco Tunnel Agreed

The Spanish and Moroccan governments have agreed to build a 38.7 km twin-bore rail tunnel (with intermediate service tunnel) under the straits of Gibraltar which separates the two countries. The tunnel is planned between Punta Palomas, 40 km west of Gibraltar and Punta Malabata, east of Tanger. The tunnel will not be at the narrowest point between the two countries, where the water crossing is around 16 km wide, but somewhat to the west of this, where the straits are "only" 300 m deep. Only 27.7 km of the tunnel will actually be under the sea and will run some 400-500 m deep. The northern portal will be situated in the village of Facinas, close to the N-340 Cadiz to Algeciras road, to facilitate the provision of shuttle services for road traffic. Financing has yet to be determined.

It is not known whether the project includes new access routes to the tunnel. Although Algeciras is serviced by the Spanish rail network, and will be some 20 km to the east of the northern portal, the line is broad gauge and non-electrified. Morocco's network is standard gauge but the Tanger line is single track and non-electrified.

Source: Today's Railways, Platform 5 Publishing, Sheffield

Earith Hospital Bunker

The following was sent to the British Medical Journal - copied for members interest:

I have just saved a historic building. I am now racked with self doubt—not because I have caused considerable trouble with a new proposal but because I wonder whether I went far enough. Erith and District Hospital was built on its present site in 1928—a pair of wards and surgical facilities in typical cottage hospital style. A small outpatient department and a radiography department were provided originally, but these outgrew their space. In 1938 the threat of war led to the construction of an underground hospital, to serve the locality as a clearing station for bomb (and gas) victims.

Half sunk into the ground and covered with a mound of earth, the bunker survived the war unscathed and, as far as we can gather, virtually unused. As life returned to normal the main hospital's radiography equipment was moved to the bunker and has remained there ever since.

The need for a new outpatient department after the war resulted in the construction of a purpose built, single storey building that would be familiar to anyone who practised in a cottage hospital in the 1950s or 1960s. Designed by the NHS Estates department and solidly finished, the clinic suites and examination areas provided a quiet haven from the bustle of the major hospitals around, and several generations of doctors and nurses have worked there happily. Postcards were made of the building. It has a large physiotherapy department with a gym, a well ordered reception and records area, a secretaries' office, a small pharmacy, and a delightful canteen run by the Women's Royal Voluntary Service. The decor is tired but serviceable; the space is slightly quirky, but it works well. The patients love it.

Meanwhile the main hospital block had ceased functioning as a mini- hospital because in the 1980s such cottage hospitals were deemed uneconomical. The site was made over to a different trust, and later to a private finance initiative partner, with our main hospital retaining a lease on the outpatient areas.

Suddenly there was a drive to modernise. The powers that be decided they wished to consolidate all their child development services on one site, and Erith Hospital was it. Plans suddenly appeared for a new centre, which would incorporate the present out-patient provision but which required the razing of the current outpatient building and the radiography bunker—the latter to accommodate extra parking needed for the hordes of new staff and perhaps some patients.

Underground hospitals are not common. Indeed our bunker at Erith is the only one on the British mainland, apart from that in the tunnels under Dover Castle. It is recognised as a heritage building and is opened yearly under the auspices of the London open house scheme (www.londonopenhouse.org) I thought the building must be listed. I discovered it was not. So I wrote to the Department of Culture, Media and Sport suggesting it was worthy of listed building status, that it was under threat and should therefore be spot listed. It was. End of car park plan—and, amusingly, the start of much excited discussion on how to make the most of the listing.

My efforts seem to have been regarded as most praiseworthy by local residents and his Indeed, a rumour went round that the health department tried to block the listing, although I have no idea if that was

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true. But although I drafted a proposal to spot list the out-patients department too (which would have killed off the child development centre outright) I didn't send it off. Why not?

A new building was needed to improve a poorly coordinated and widely dispersed children's ervice. To put it on the Erith Hospital site (the cheapest option) required the demolition of the outpatients department, which was "tired and old." A brand new outpatients' facility would be incorporated in the new building. So to stand in its way would be wrong. On the other hand the present building is a classic design of the 1950s that continues to function perfectly.

How many purpose built outpatients buildings of that era still survive? If we knock them all down how will we judge the facilities and practices of the past? Is there any less reason to save our out- patients building than the radiography bunker? Should we not preserve some of our better NHS buildings, not least if they can be working museums?

So I appeal to readers to tell me what to do. Apply for the Erith outpatients building to be saved, or do nothing? Go boldly but blinkered into the future, or allow tomorrow to be informed by yesterday?

Source: Andrew Bamji, consultant in rheumatology, Queen Mary's Hospital, Sidcup, Kent.

Winchester ROC GP. HQ. Part One

VETERANS have launched a campaign to stop developers who are threatening a unique piece of Hampshire history. The disused Royal Observer Corps headquarters in Winchester could soon be converted into homes. Bayview Developments wants to turn the 1940s building in Abbotts Road into four homes as part of plan for 27 homes. Opponents say the building is the last original operations room left in Britain and the conversion will ruin it. The ROC played a crucial role in spotting and identifying German aircraft over Hampshire in the Second World War. It also played a part during the preparations for D-Day in 1944. This summer thousands of local veterans will mark the 60th anniversary of the invasion of France.

The Winchester base was used until 1991, when the ROC was disbanded at the end of the Cold War. Built in 1943, it is the last remaining operations centre in its original condition and its importance was recognised in 1993 when it was listed. An attempt to get National Lottery funding in the mid-1990s to convert it into a museum was unsuccessful. Neville Cullingford, the curator of the ROC Museum Trust, said: "The site will be developed but we strongly object to the proposal to convert the listed building into four homes, which would ruin it. It is the last remaining operations room of its type in the UK." Mr Cullingford, of Roselands Close, Fair Oak, near Eastleigh, added: "We are against this destruction of our heritage. The building can't be developed without destroying its ambience and integrity. Ideally we would like it retained for heritage use."

Also opposed to the plan is the base's last commanding officer, Tony Maasz, of Twyford Road, Eastleigh. He said: "It is the only remaining operations centre in the country. It had a very important role in the D-Day operations. It had the job of tracking all the aircraft that come over, friendly or not. "It is important nationally and part of Winchester's heritage. It is not a pretty building but it ought to be preserved. The idea that it can be converted to housing is ridiculous."

Mr Maasz, chairman of the local ROC association, has written to Hampshire County Council to alert it to the threat. A campaign has been started to oppose the plans. The deadline for comments to the city council is February 20. Mr Cullingford said of the importance of the ROC: "It has been said the Battle of Britain was a very close-run thing. The key to the British success, the element that tipped the balance, was the ROC. It was the only way the RAF could learn of enemy aircraft once they had crossed the coast and passed the radar." The site, which is locked and inaccessible to the public, has been empty for ten years. Mr Cullingford said when the site was sold by the Ministry of Defence a clause stipulated that if it was developed within ten years, a portion of the profit would be refunded to the MoD.

Source: Andrew Napier Southern Daily Echo

Winchester ROC GP. HQ. Part Two

THE ONLY hope for an historic former military building in Winchester is to redevelop it.

That's the view of the company hoping to convert the Royal Observer Corps in Winchester into four homes. The proposal, which is part of a scheme to build 27 homes, has angered veterans who say the building played an important role in the Second World War. ExROC men say transforming the threatened building into new homes would jeopardise the integrity of the 1940s structure. The corps played a crucial role in the Battle of Britain in spotting and identifying German aircraft over Hampshire. The Winchester building erected in 1943 was involved in the build-up to the D-Day landing in 1944 which will be marked by hundreds of ex servicemen later this year. Bayview developments proposes to change the building off Abbotts Road, Abbotts Barton, into four homes. Edward Bizzey, project manager for the Southampton based firm, said: "The only way this building is going to survive is if someone spends a lot of money on it. We are actually saving a listed building, not demolishing it or ruining the heritage. "Something must be done with it. Realistically that means housing. If we do not go in there it is either going to be burnt down by vandals or become unsaveable. Its condition is going to get worse and worse." Attempts

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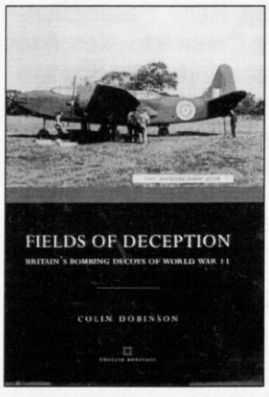
to get National Lottery funding to convert the building into a museum in the mid1990s were unsuccessful, making any use other then residential as highly unlikely. The city council has designated the site as residential in its forthcoming district plan. Mr Bizzey is meeting former ROC men Neville Cullingford and Tony Maasz next Monday to discuss the plans. They have expressed their opposition to the scheme which will affect the last remaining operations centre in its original condition. Its importance was recognised in 1993 when it was listed. Mr Bizzey said the site's history would not be ignored as a plaque would be placed on the front of the building. The large openplan space where wartime operations were conducted would be retained as part of one home. Mr Bizzey said: "We don't want this to be a battle. We would rather work with people. We don't want to be confrontational as we understand people's concerns." Winchester MP Mark Oaten is due to visit the base next Thursday.

Books



Fields of Deception
Britain's Bombing Decoys of World War II
Colin Dobison Published by English Heritage through Methuen ISBN 0 413 74570 8 £25

As usual with English Heritage titles, this book is immaculately researched, well illustrated and (most importantly from our perspective) it has a full site list at the back with NGRs! Mr Dobinson tells the story of Colonel J F Turner, his relationship with the budding British film industry, and the smoke and mirrors tricks that they jointly played with the Luftwaffe; from plans laid down in 1938 through to the end of the hostilities.

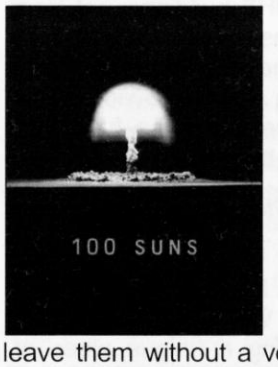
The book tells the whole story, but it lacks pace and concentrates on the political struggles of the people more than on the sites themselves. This is a shame for us because the interesting feature of every decoy site is a rather cute little control bunker, very many of which survive.

The great thing about Q sites (which is what decoys were designated) is that they are nearly all in fairly out of the way places, marshes are popular, because their raison d'etre was to be bombed. They were quite good at it too, drawing nearly 5% of all the German bombs intended for our houses and factories, and perhaps saving up to 3,000 lives in the process. The Q sites are also spread all over the country so there will be one on your doorstep.

The good thing about remote sites, is that the things built on them don't get torn apart by vandals. I know of two of these control bunkers myself (one at Portsmouth and one on Pevensey Levels) and they're both in pretty good nick.

Using the site gazetteer is a doddle and I was surprised at how many were dotted around my area in Kent and the Surrey Downs. Places I know well were once Q sites, and on my first walk out I found some concrete flame troughs (to simulate bomb-damaged buildings) just dragged into the field border. So, get a copy, read it, get your map out, go visit some sites and start looking for lumps of concrete sticking out of the ground.

John Smiles



100 Suns
Michael Light Published by Jonathan Cape ISBN 0-224-064517 Price: £30.00

Having been given the inevitable Christmas money, I scuttled off to Waterstones despite my self-imposed ban on going anywhere near bookstores as I can never leave them without a volume in my hand. This time, with a clear conscience, I came out with 100 Suns, compiled by Michael Light, which is what some of us would call a coffee-table book.

The book is a collection of photographs, many in colour, from the US military archives and depicts the atmospheric nuclear weapons tests from 1945 to 1962 when the Limited Test Ban Treaty came into effect and all testing moved underground. As well as the actual explosions themselves there are some excellent photographs of the spectating troops and their reactions to such an awesome sight.

The photographs are divided into two groups: Desert, which features the Nevada tests, and Ocean, which covers those carried out on the atolls and some underwater explosions.

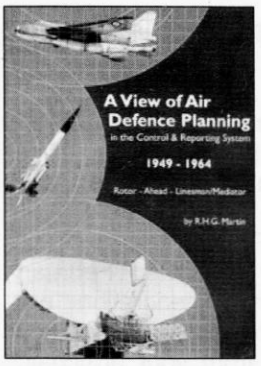
The yields range from a few tonnes to multi-megatons and encompasses some of the best known tests, including "Trinity" from 1945 which needs no explanation, and "Mike", the world's first H-bomb.

There is a comprehensive text list of each test, the codename of the whole operation (e.g. bomb "Baker", Operation Crossroads). There is also a brief overview of the Cold War and weapons testing in general.

The photography is spectacular and should be of value to anyone who has an interest in the atmospheric testing of the 1950s and 1960s.

Jane MacGregor

Books



A view of air defence planning in the control and reporting system 1949 - 1964 - Rotor ~ Ahead ~ Linesman/Mediator'

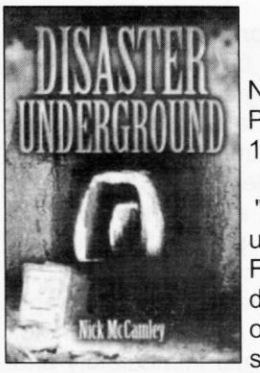
R H G Martin Cost £32 plus £2,50 postage from R H G Martin, PO Box 6044,Newbury,RG14 2LG. ISBN 0-9546017-0-X

The book reviews some of the technological, political and financial influences which shaped the air defences of the United Kingdom during the early years of the Cold War. It is in hardback cover and includes 204 pages (128 x 296 mms) with 40 pictures and more than 25 diagrams.

It covers a period in the history of the Control and Reporting System of the Royal Air Force when the requirement was changing; firstly to face the threats of the early years of the Cold War (Rotor Plan) and then the realization of the need for a more advanced system for the control of ground-to-air guided missiles and for the control of supersonic fighter aircraft against supersonic targets (Plan Ahead). The Joint Intelligence Committee considered that nuclear ballistic missiles may become a major threat from about 1963. The Government decided that the large sums required in Plan Ahead and the accompanying weapons programme would not be justified when nuclear missiles became a major threat to the country.

Nevertheless, we would have to guard against airborne reconnaissance and intense electronic jamming, carried out with a view to neutralizing our detection systems and --means of offensive reaction. The Government realized that the future requirements for radar cover for air defence and air traffic control were similar. Additionally, both services were moving towards greater efficiency and effectiveness through the use of automation. A joint system of air defence and air traffic control was therefore examined in depth and resulted in the combined system under the names Linesman (Defence) and Mediator (Air Traffic Control).

Note on the author. Richard Martin joined the Air Ministry Research Establishment (AMRE) in October 1939. Throughout its moves to Swanage (TRE) and Malvern (RRE), he worked on several ground radar projects including radar displays, glider-borne radar ground stations, and he initiated work on digital radar data extraction and processing, demonstrated to the Air Ministry in 1951. He was directly involved in the planning of both Ahead and Linesman/Mediator,. He left RRE in 1964 to take up an appointment in the European Organisation for the Safety of Air Navigation (Eurocontrol) in Brussels, from where he retired in 1977.



Disaster Underground

Nick McCamley Published by Pen and Sword ISBN: 1844150224 price: £19.95

"On 27 November 1944 the underground RAF bomb store at Fauld in Staffordshire exploded, destroying two farms and much of the village of Scropton, killing seventy men and women in an instant. Approximately 4,000 tons of bombs had exploded en-mass in the mine, which was some ninety feet below ground, leaving a crater nearly half-a-mile in diameter. The Fauld disaster still maintains the dubious distinction of having been the largest and most devastating explosion ever to have occurred on the British mainland.

"Disaster Underground" tells the complete story of the events that led up to the incident and of all the subsequent investigations. It is a story of ineptitude and incompetence in every aspect of the RAF's wartime administration.

To set the scene the early chapters describe in some detail the birth of No.42 Group, the arm of RAF maintenance command responsible for supply of ammunition and explosives to the fighting units. The development, design and construction of all the surface ammunition depots constructed in the inter-war years is described in some detail. A major portion of the book is dedicated to the development of the five huge underground reserve depots at Chilmark, Fauld, Harpur Hill, Llanberis and Linley, and subsequently to the disasters that overtook all of them except one.

Briefly: the Fauld depot blew up, Llanberis fell down, Harpur Hill was evacuated before it could fall down and Linley was abandoned before it collapsed completely. Only Chilmark lived out the war comparatively unscathed.

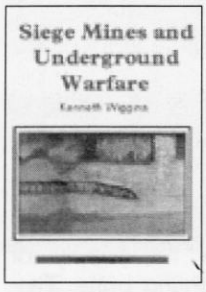
Every aspect of the Fauld disaster is investigated in great detail based upon the official Court of Inquiry papers and other documents only recently released into the public domain. Similarly, this book's examination of the collapse of the Llanberis depot is based upon evidence never before published.

Until now the extensive but long abandoned underground depot at Linley has been something of a mystery but "Disasters Underground" throws new light on it and provides, for the first time, detailed plans of the site.

The penultimate section of the book looks at the RAF's (and the British governments) disastrous foray into chemical weapons during the Second World War and its post-war consequences. Subjects touched upon in this section include the mustard gas factory and underground storage site at Rhydymwyn in north Wales, the sinister ICI poison gas factories in the Runcorn area, and the Forward Filling Depots with

Books

their huge underground bulk storage tanks for poison gas, strategically sited near the bomber bases. All of these were subject to mishaps, great or small.
The final section deals with the farcical methods used to dispose of the vast redundant stockpiles of mustard gas and captured German 'Tabun' nerve agent left at the end of the war, and of the role of the Bowes Moor depot and the ports of Siloth and Cairnryan in this disposal.
The book is illustrated with over sixty photographs including numerous, previously unpublished, photos of the underground depot at Fauld immediately after the explosion.
Detailed plans of all the underground sites are included, along with aerial photographs and plans of many surface depots."



"Siege Mines and Underground Warfare"

by K Wiggins. Shire Publications 2003. A5, 56 pages, about 40 illustrations, plans and photos. Cost £5.00.

This is an interesting little book which is rather wider in coverage than the title indicates. The early chapters deal with "siege mines", such as the building of heavily covered passage ways to the walls of a fortress as protection when removing the foundations of the walls. These structures did not involve any subterranean work. Obviously, subterranean tunnels were better for this work since the "miners" entry would not be obvious.
Apparently the digging of underground siege tunnels is described in a Roman book that was translated into English by John Sadler in 1572 for his work "The Foure Books of Martiall Policye". A very early "mining" publication!
In more recent times King Stephen (1135-54) summoned men who were skilled in underground mining to dig tunnels to demolish the walls of Exeter. Similar events later took place at Rochester, Dover and other places. By the 16th Century quite elaborate systems of tunnels were in use, as well as evidence of counter tunnelling by the besieged. During the 17th Century, including the Civil War period, civilian miners were used, and for the first time explosives were used in driving these tunnels.
Much of the remainder of the book deals with underground work abroad in which British Military Engineers were very much involved, as in India and during the First World War.
The book makes for a fascinating read and is well worth getting. The bibliography at the end is, itself, a most useful piece of work.

Dr Ivor J Brown
Reprinted from the Newsletter of the Peak District Mines Historical Society

Drakelow RSG

Video / DVD - Drakelow RSG now available from Moore Books Running Time 28 minutes Price:Video £12.95 inc P&P DVD £14.95 inc P&P
Available as a video or DVD Recorded February 1997 well before the current deterioration and vandalism took place many items that have now permanently lost can be seen from your armchair. Videos produced by IA recordings are always of the highest quality and this one is no exception throughout a location map of the site is given which will help orientate you through this labyrinth
Deep in the sandstone hill at Drakelow near Kidderminster, 5km of tunnels were dug in 1942 to house a hidden factory. The Rover Company was building parts for radial aero engines and its plants in Birmingham and Coventry were very vulnerable to air raids. Over 26,000 square metres of underground floor space housed machine tools, heat treatment gear, laboratories, store rooms, offices, a canteen, a dining room and games rooms.
In the 1960's the threat was different - the cold war. Drakelow was refurbished as a Regional Seat of Government - a nuclear bunker designed to help control the population of the Midlands in the aftermath of holocaust. It had its own independent water supply, generator, air conditioning and air filters. There were male and female dormitories, a sick bay with operating theatre, offices and BBC radio studios. This role lasted in various forms until 1993, when the site was removed from the secret list and sold off.
This tape shows an exploration of the whole complex, starting in the Rover factory area with remains such as the original blast doors, time office, an electric truck, the battery room, a laboratory and the massive ventilation fan. The 1960's period is represented by a canteen, dormitories, offices and a BBC studio. The 1980's-90's relics include shower rooms, the generator hall and the fallout decontamination facility, together with another BBC studio and a kitchen with its stainless steel equipment virtually unused.

Mike Moore

Sub Brit Needs You!
Editor - Subterranea

After two years in the Job, I feel its time to stand down as Editor of Subterranea. I will see the year out with the December 2004 issue being my last. Do you think you could step into the breach? You will need a PC or MAC, with skills in, and access to, Photoshop and a DTP programme such as Quark or MS Publisher. I will give all the help and advice I can. Please contact me or a committee member for more details.

Swynnerton RGHQ 9.1

Swynnerton RGHQ (9.1) stands on the site of a WW2 Royal Ordnance Filling Factory built in 1941. The site was closed in 1957 but reactivated in 1962 with a plan to use two of the semi-sunken explosives magazines as the civil defence Group Control for North Staffordshire and Stoke County Borough Control.

In 1964 Group Controls were abolished and the bunker became the Staffordshire County Control and County Training Centre. In 1967 the County Control was relocated to the basement of the county buildings in Stafford (completed 1969) and after 1968 the bunker was put on care and maintenance although the whole factory site was still owned by the MOD and used as an army training area.

In the early 1980's the bunker was reactivated as SRHQ 9.1 and in 1988 was refitted as RGHQ 9.1 serving the eastern part of the West Midlands, finally closing in 1992. It was sold back to the army who have been unable to use it on health and safety grounds as it had remained empty and was believed to have toxic gasses including methane. Although there have been a number of open days at the training area the bunker has always remained strictly out of bounds.

The bunker is located on the north side of Valley Road, an internal training area road, at the southwest end of what were the Group 9 explosives storage magazines. Magazines 3 & 5 were utilized with a new covered way constructed to link the two together.

Within the bunker there was accommodation for the regional commissioner and his immediate support staff, representatives from government departments and military liaison officers. The bunker was designed to he self-sufficient, and contained facilities to carry out its functions for a number of months. Ancillary services required to keep the bunker functioning included; fuel and food stocks, a diesel generator, air filtration plant, radio communications, dormitories, lavatories, a kitchen and restaurant.

The main entrance to the complex is located on the southeast corner of the southern bunker (No 3) and incorporates the former rail entrance to the magazine. All exposed concrete surfaces are painted emerald green.

The front of the bunker was completely rebuilt in

Swynnerton RGHQ 9.1

1988 with a double storey entrance block incorporating a new extension at right angles to the main entrance that houses the standby generators. This is a two level structure accessed through its own steel blast door on the southern face; above the entrance there are two downward facing cowls which are probably the exhaust vents. There is no internal connection between the standby set house and the rest of the bunker. It was not possible to see the generators as the door lock was seized and could not be opened. A small brick building on the south side of the standby set house is of unknown date and use and may have no connection with the RGHQ.

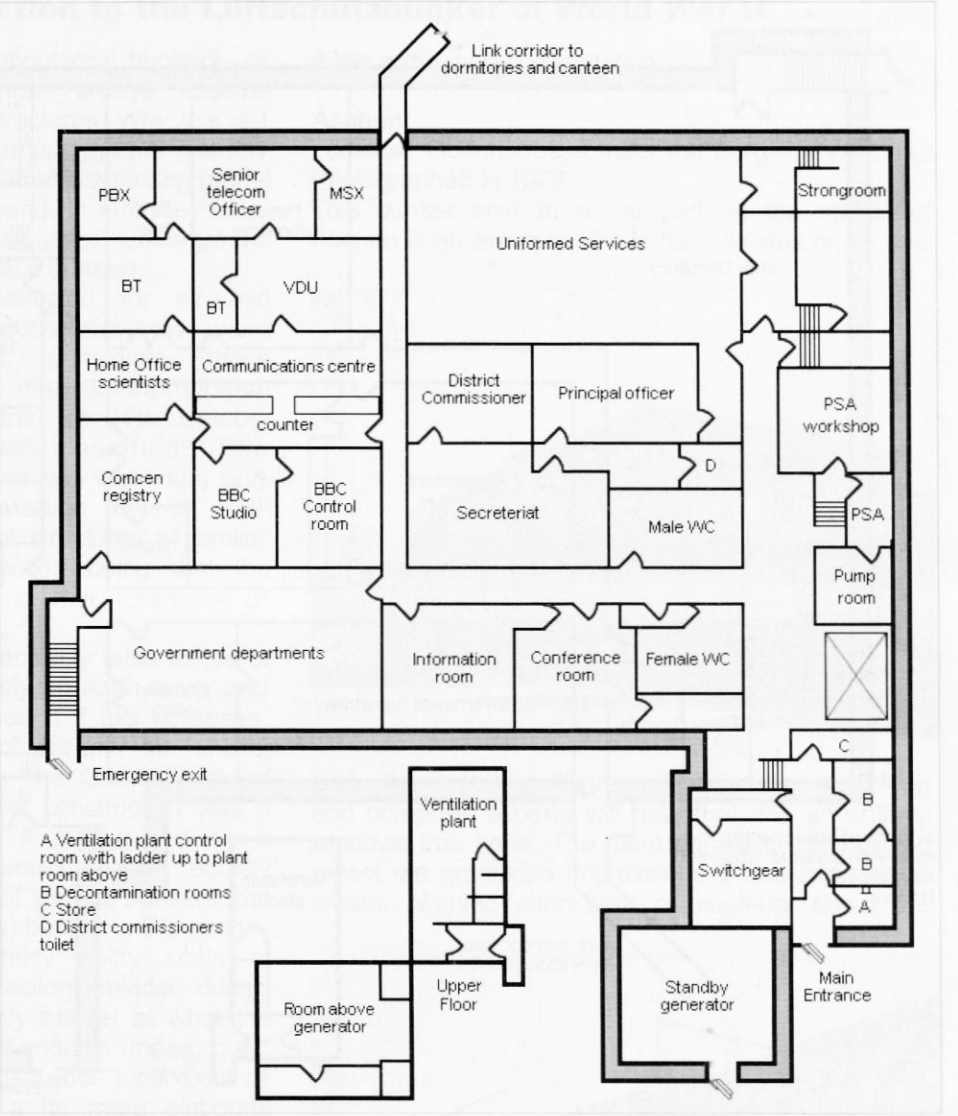
The main entrance into the 'operations' bunker is through a ground level steel blast door. Once inside a door on the right leads into a small switchgear room for the ventilation plant. There are two wall mounted cabinets; the larger is the control unit for the ventilation plant and the smaller is a large switch box with a padlock on it. Between the two boxes there is a ladder to the upper level ventilation plant consisting of filters and a fan which controls the air circulation by feeding filtered air through metal trunking running through the bunker. This plant only services the southern bunker. There is an external entrance to this upper level by means of a steel staircase on the eastern face which gives access to a small concrete balcony and steel blast door. The air intake for the ventilation plant is on the southern elevation where there is a steel blast plate. Exhaust was extracted through a single downward facing cowl positioned to the north of the upper door.

Back in the entrance lobby there is a second door with as glass viewing window alongside. Passing through there are two routes into the bunker, straight ahead along a short corridor or to the right through two decontamination rooms. The first room contains a small shower, sink and a disposal bin for contaminated clothes; the second room was for dressing with a second door back into the entrance corridor. To the left is the main switchgear room for controlling the electrical circuits throughout both bunkers including all the controls for the standby generator. There are four floor standing electrical

Swynnerton RGHQ 9.1

cabinets and two smaller wall mounted cabinets.

Beyond the switchgear room there are four steps up to the left. The entrance corridor is on the line of the standard gauge railway loading bay for the magazine with the steps up to the level of the railway platform. The loading bay itself has now been partitioned into a number of rooms, each with steps down to the original rail level. A wide corridor runs along the platform with a large water tank on the right, beyond that there are steps down to three rooms. The largest room is the PSA workshop with a large work bench along one wall which is, in fact, the edge of the railway platform. Passing through the smaller PSA room the water pumps are located in the third room. Back in the main corridor, there are three further rooms with steps down to railway level; one of these was the strong room which still retains a large safe



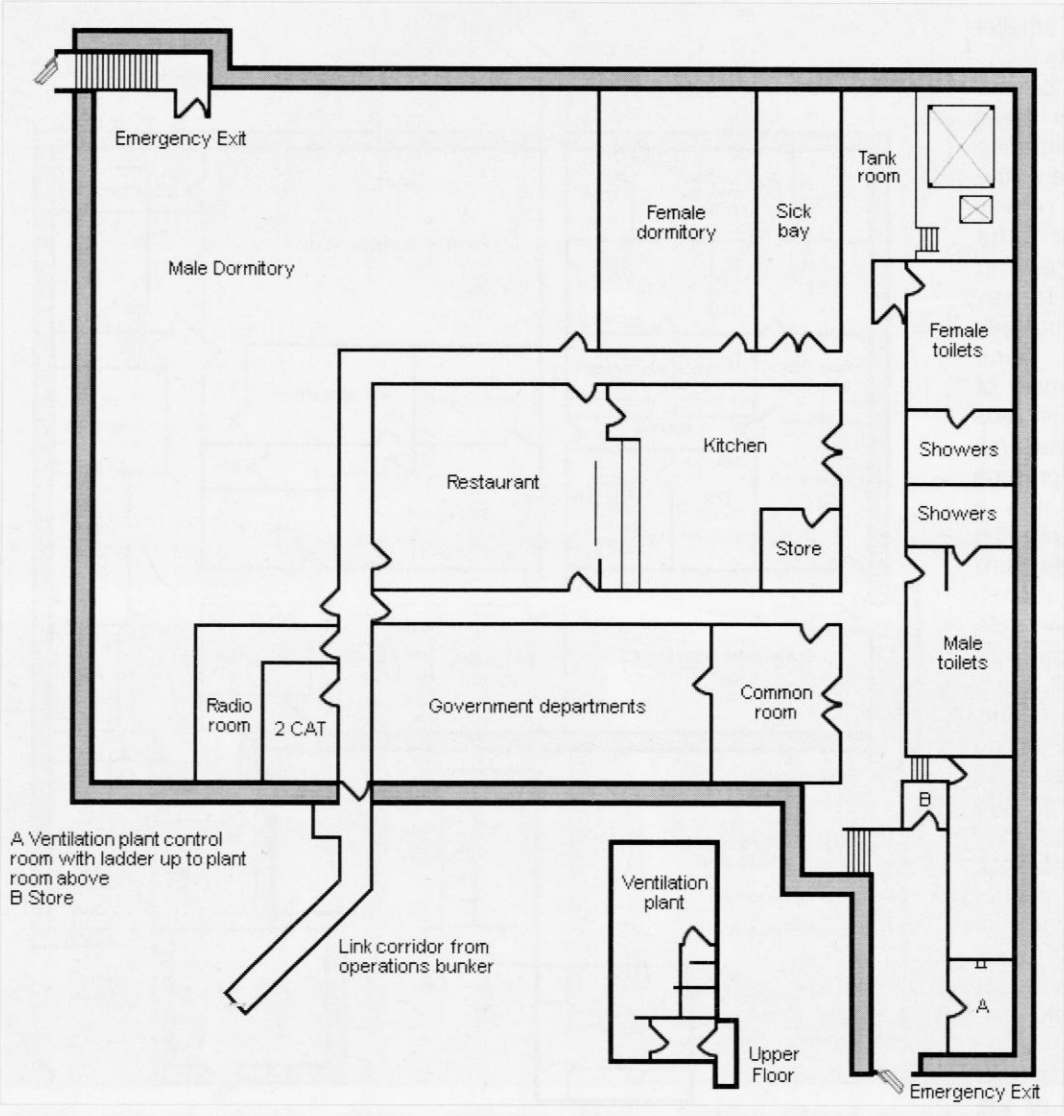
The remaining part of the bunker is at the same level as the platform with all the rooms being accessed from an 'L' shaped corridor. Most of the rooms have been stripped of any fixtures and fittings apart from ventilation trunking and basic electrical fittings. The two BBC rooms, a studio and control room have acoustic tiles on the walls and a glass window between them. The BBC rooms are reached through the 'Communications Centre' which is sometimes referred to as the 'Counter Room' as it has a physical counter running from east to west across the room. The VDU room has ceiling mountings for a large piece of electrical equipment and the BT room has the ceiling mounted rack that supported the main distribution frame (MDF) and a wall mounted cabinet containing all the incoming phone lines.

As built, the magazine had 30 concrete pillars in five lines of six pillars for additional roof support. All of these have been retained some being incorporated into new partition while others are free standing in the larger rooms. There is an emergency exit in the south west corner of the bunker consisting of a flight of stairs. As the stair rises above the ground it is protected by a reinforced concrete exit blockhouse with a steel blast door.

In the middle of the north side of the bunker, at one end of the 'L' shaped corridor there is the connecting tunnel to the second bunker, originally magazine No. 5. This tunnel is approximately 150 feet in length and was built at ground level and later covered over with soil and grassed. It is a of a very basic construction, rectangular in section with a bare concrete floor and pre cast reinforced concrete wall and ceiling panels. The tunnel has never been painted or internally lined and has no forced ventilation. In the middle the tunnel is raised by six feet for a short length with steps up and down again, it is assumed that at this point it passed over a pipe or cables.

The second bunker was originally an identical magazine and following conversion it housed mainly the domestic rooms with a few operational rooms on the south side. The link corridor from the operations bunker enters on the south side. The large 'L' shaped male dormitory occupies the entire west and half of the north side of the bunker with another emergency

Swynnerton RGHQ 9.1



exit stairway in the north west corner. Alongside is the female dormitory which is about a quarter the size and next to that the sick bay.

The kitchen and restaurant occupy the centre of the bunker, the restaurant has some wall decorations and atmospheric wall lights with a translucent screen on the east side hiding the stainless steel serving counter. The kitchen is one of the few rooms in the bunker that had not been stripped retaining all its stainless steel units and appliances including ovens, hot plates, water heaters sinks, fridge, freezer etc.

Running north to south along the east side of the bunker there is a wide corridor which was originally the railway platform. Unlike the operations bunker the loading bay has been largely filled in bringing the floor level up to that of the platform. Only one end has a section of the original sunken loading bay been retained. At the northern end this consists of a tank room with steel steps down to the tanks. In the middle are the main male and female toilets consisting of a long line of WC cubicles (and urinals in the male toilet) along one wall and a line of hand basins along the opposite wall. At one end of each room there is a separate shower room with a number of shower cubicles. At the south end of the corridor, steps lead down to an entrance lobby which again has been rebuilt as a two level structure with a second ventilation switchgear room and a ladder up to an identical ventilation plant room. Although there is an entrance blast door it's unlikely this was used and it probably acted as a third emergency exit.

Both bunkers are clean and dry but have been disconnected from mains water and electricity. A third magazine has been converted on the south side of Valley Road but this has no connection with the RGHQ and is part of the present military training area. On the west side of the operations bunker a large lattice communications mast still stands surrounded by a wire mesh fence; this appears to be completely unused. Although the bunker appears in good condition the army has no immediate use for it as it would cost too much money to bring it up to a safe usable condition. No further visits will be allowed.

Sources: Bob Jenner

RCHME Survey Report - Cold War Project Survey Report Regional Government Headquarters 9.1 by Wayne Cocroft (RCHME/English Heritage)

Text, Photos and Drawings From Nick Catford

German Air-Raid Shelters

An introduction to the Luftschutzbunker of World War II

Except when we are talking about coal bunkers—or indeed oil bunkers—we British always assume bunkers to be underground structures. Why this is I am not quite sure, but the Germans did not feel any obligation to build all their Luftschutzbunker (aerial protection bunkers) below ground. In fact they have two words for the notion, Tiefbunker (underground bunker) and Hochbunker (surface bunker).

Many of the bunkers constructed for air raid protection from the mid-1930s onwards were constructed above ground, particularly those constructed under the Führer-Sofortprogramm (Hitler's Immediate Programme) of 10th October 1940. These were sub-classified into Luftschutzhäuser (air raid protection buildings) and Luftschutztürme (air raid protection towers). Both patterns were very substantial structures of similar construction, the chief distinction being that the 'towers' were circular in ground plan. Examples of both types are shown here.

Underground shelters give a possibly false sense of security. For protection they rely on earth cover and any structures overhead, although if this collapses, caves in or blocks means of escape, the shelter provided is of no real value. The German way of thinking was that above-ground construction was a lot simpler and faster, and if carried out on a sufficiently massive scale, would provide equally good protection. The number of surface bunkers that survived intact (or largely intact) bears out this notion.

Anyone familiar with the fairly paltry scale of organised civilian air raid protection provided during the last war in Britain will only marvel at what the Germans achieved. Whereas London's underground air raid shelters aimed to protect just 1 per cent of people at risk, in Germany a far more elaborate construction programme set out to provide shelter for 5 per cent of the population in 70 cities, using elaborate above-ground structures of massive proportions. Measured against London's provision, they were both luxurious internally and elegant externally.

After the war these structures proved to be very difficult to demolish and for many new uses were found. Some were turned into residence blocks for students, while in Hamburg a huge bunker became the city's first television studio centre.

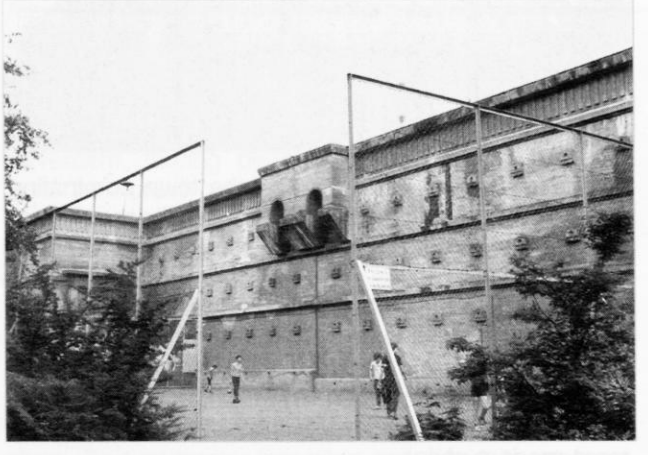
As example of air raid shelters built in large towns and cities we will take the towns of Aachen, on the western flank of Germany, and Breslau, capital of the region of Silesia. After the last war, Breslau and the surrounding region were ceded to the Poles as part of the carve-up that occurred when Poland was shifted westwards. Today Breslau is called Wróclaw (pronounced something like Vrots-laav) and is home to virtually the whole population of Lwow (Lemberg) after its citizens were displaced from there by the Allies without any consultation.

Aachen

Location: Goffartstrasse, near the Burg Frankenberg. Photographed in 1979.

This bunker next to a car park in the middle of Aachen is an example of a Luftschutzhaus or 'air raid

protection building'. The architecture is quite striking and computer experts will note that it is an entirely windows-free zone. The giant portals to the building reflect the grandiose impressions it was intended to create. Nothing short-term or austerity about this



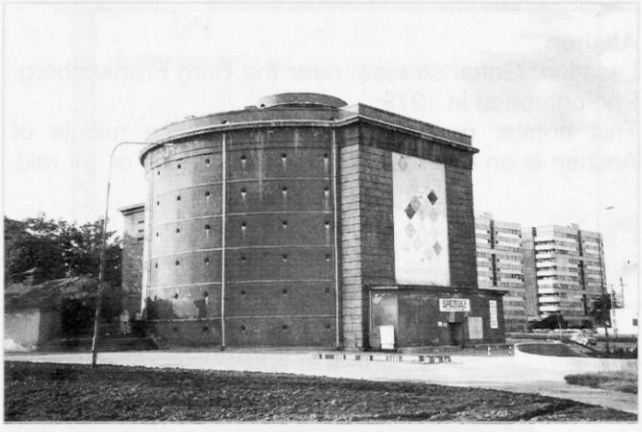
structure!

The purpose of the buttresses and 'portholes' is not obvious to me but architects may well be able to explain (feedback will be most welcome!). The tripod structure on the roof is an air raid siren with a rain cover above it. The assembly area outside the bunker had become a sports ground.

When these photos were taken the bunker was seemingly derelict but today it serves as a concert hall and exhibition venue under the name MuBu or Musikbunker (Music Bunker)

German Air-Raid Shelters

Wróclaw (formerly Breslau)
Photographed in 1990



This is one of the numerous designs of Luftschutzturm or air raid protection tower. It appears to be a public building currently but our guide could not provide exact detail. It stands on the Frankfurterstrasse (ul. Legnicka).
It was designed by Richard Konwiarz in 1940 and

stands in a park on the edge of the town dominating the vista from all directions. Its architectural lines means that the structure integrates adequately well into the townscape.
The second picture shows the monumental scale of this air raid shelter extension to an existing block of flats. The original 'heritage' style dormer windows (shown in the architect's drawing on page 112 of Bauen unterm Hakenkreuz) have been rebuilt in a more modern style).
The blocked entrance portal echoes the Egyptian style popular in the 1930s. The architect was Richard Konwiarz (1940) and the location is the Kopischstrasse (ul. Stalowa).
Next to the small doorway arch are two enameled-steel plates. The left-hand one is a type found throughout the former Communist countries and indicates the building or structure is a heritage object. Should hostilities break out, every effort must be made for it to be preserved. The sign on the right states: "District Inspectorate: Civil Defence Warehouse Store No. 1".

Further resources on the Internet.

German concrete Air Raid Shelters ("Luftschutzbunker") at:

http://www.warplaces.net/uk040.htm#Luftschutzbunker%20Saarstraße,%20Aachen,%20Germany
[in English]

Air Raid Shelter Study Group (IGEL)

http://luftschutzbunker-forum.de/phpBB/
[in German]

Air Raid Shelter links

http://www.luftschutz-bunker.de/sitemap_neu.htm
[in German]

Books to read

Michael Foedrowitz: Bunkerwelten: Luftschutzanlagen in Norddeutschland (Air Raid Protection Installations in North Germany). Ch. Links Verlag, 1998. This very detailed book covers the planning and construction of bunkers, daily life inside them plus their subsequent fates, predominantly in northern Germany and Berlin.

Michael Foedrowitz: Luftschutztürme und ihre Bauarten 1934 bis heute (Air Raid Protection Towers and their Constructional Forms 1934 to Present). Podzun-Pallas, 1998. This shorter book concentrates on the technical details of towers, again in northern Germany only.

Helmut Weihsmann: Bauen unterm Hakenkreuz: Architektur des Untergangs (Building under the Swastika: Archiecture of Defeat). Promedia, 1998.

Pictures And Text From Andrew Emmerson

The City Streets Beneath

Most of the sites that interest Sub-Britters have always been underground, but not all of them. A chance conversation with a co-mole while waiting our turn to crawl through in an eyehole in a disused mine, led me to the fascinating story of Seattle and how it, quite literally, got itself out of the s**t.

On 6 June 1889, a pot of carpenters' glue boiled over on a stove and into some turpentine-soaked wood shavings. Within half an hour, whole blocks of Seattle were ablaze. Hydrant pressure dropped to nothing, so depriving the residents of any means to combat the inferno. The smoke column was visible in Tacoma, Washington, 32 miles to the south.

The city's Mayor, one Robert Moran, took personal charge of the fire fighting operation and had swathes of buildings in front of the fire cleared as firebreaks. Human chains were organised to carry buckets to and from Puget Sound to pour on the blaze but they made predictably little impact - nice try, but no cigar.

The Great Fire lasted 12 hours and by the time its fury was spent, 64 acres of the city lay in ashes. Amazingly, the records show that not one person died in the disaster. What might seem even more surprising was the optimism of the locals had also survived - the Seattle Times reported, "Everywhere confidence in the future of this city is maintained. . . . The heaviest losers are the most cheerful."

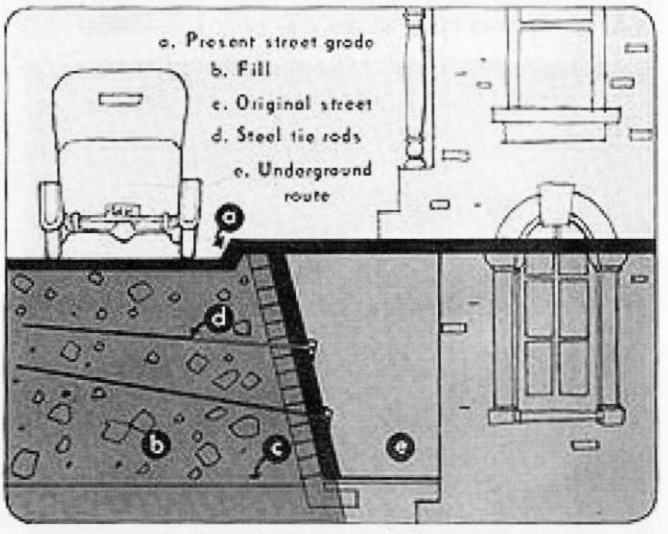
This view is better understood if we skip back a few pages in the history book. Up to 1889 Seattle was just establishing itself and was a real frontier town.

In its first twenty years, the city was thrown together on the tidal mudflats of the Sound, planning was non-existent and the result was a town wracked with disease, violence and vermin. The big blaze gave the civic authorities a welcome clean sheet on which they could reinvent Seattle, this time in a rather more robust and sanitary form.

Seattle's problems stemmed from simple topography (the shape of the land) and the fact that, in the first instance it wasn't on land at all, but water. A few hundred feet from the present-day Pioneer Square was a small island named Duwamps Island (after the Duwamish Indians). Early settlers dammed, drained and filled the bay, turning the island into a peninsula, and changed its name to Seattle. The city rapidly grew, much of it on stilts because of continual flooding.

With street made from infill balanced on a swamp, conditions underfoot were less than ideal. Huge potholes frequently opened up and usually filled with water. The magnificently titled Seattle Post-Intelligencer carried a report of an unfortunate (and presumably rather dim) 10-year-old boy who drowned while attempting to raft across a 12-foot-square pothole, 8 feet deep, at a busy junction. Poor kid, but you have to wonder about his career prospects.

Reconstruction after the fire was necessarily very quick and was not well coordinated. Buildings were erected before city officials could implement their plan to elevate the street level nearest the water. The city fathers solved this problem with simplicity that would be impossible in the modern era, they ordered them raised after the construction of the buildings. Stone walls were built on each side of the roadways (see diagram) and filled with whatever materials were available – and I mean whatever materials - before surfacing.



Raising the city improved the lot of Seattlites in two distinct ways – no more flooding and an end to the rather unsettling plumbing problem that twice each day, with the tides, the toilets would back up. Early residents dealt with this problem by rising above it; installing their toilets upstairs to avoid the overflow.

The new streets were 8 to 32 feet above the original street level. The results must have been comical, as streets were often raised before the adjoining pavement, forcing pedestrians to scale tall ladders just to cross the road. This caused some consternation to the ladies of the city who hardly wanted to expose their undergarments to the street. The problem was even more severe for gentlemen who enjoyed a drink or two, 17 of whom died from falls.

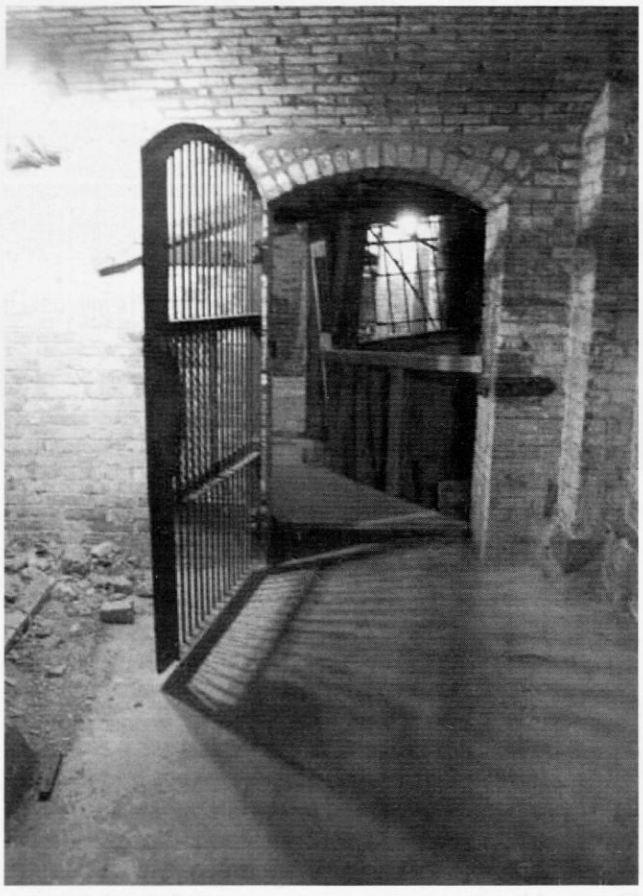
The situation persisted for about a decade as, first, bridges were placed over parts of some paths and, eventually, complete new pavements covered the old ones. The originals, however, remained in use and were illuminated by glass skylights.

In 1907, an outbreak of plague prompted the underground portion of Seattle to be condemned. This just meant that all the legitimate businesses moved out, giving the whole network a new lease of life when prohibition drove drinkers, in the literal sense, underground.

For decades after the Underground was created, the buried buildings continued to be used by the poor. Japantown had previously been so far out on the mudflats that it was like Venice; everyone got around in boats. The slightly richer & older Chinatown had

The City Streets Beneath

been close to Pioneer Square, starting at a point called Occidental. A 1902 law said that "no yellow man could set foot past [this point]" turning it into prime real estate in the newly built city and giving it the name Occidental (the opposite of Oriental).
Since the Chinese had no place else to go, they simply went down into the old streets and lived out of sight. Tong societies' gambling enterprises and opium dens even persisted long after the new Chinatown was built, all the way up to the 1940s.



What survives?

As a living city, Seattle has been clearing sections of the underground progressively since it was first created. Even today, new developments frequently open up small sections as they excavate the foundations for new buildings.
Up to the interwar years, the various parts of the underground were still linked and you could traverse a good part of the city centre without breaking cover. Sadly the skyscrapers raised in the 1920s needed very deep roots & only a few discontinuous pockets of the underground survived their construction.
Some sections are preserved as retro-chic, with basement bars and boutiques. One such, Doc Maynard's Tavern, is home to a business that conducts tourist tours of a small section of the underground. Several members have taken the tour and they tell me that it is enjoyable, if brief. Several American urban exploration websites also claim to have established access to other pockets of underground frontages which persist.
One last fragment of the underground appeared briefly when the last mooring pier was demolished on the waterfront (which, bizarrely, now has no actual access to the water). When the rotten dock was torn down, a row of buildings was exposed, the floors of which were now four feet underwater. These submerged buildings would once have sat above the tide line except during storms or unusually high tides but, in the fifties, the US Army Corp of Engineers created an artificial deepwater port by digging out the flats. Few people know that one of the great engineering wonders of the world is in Puget Sound, a massive dam that keeps Seattle from sinking into the sea and transforming what was once mudflats & beaches into a waterside perch for the city.
As a final aside, the discussion on Seattle that I started on the Sub Brit e-list made clear that Seattle is far from unique. Correspondents in Bristol, Edinburgh (open tourist site under Royal Mile) and Manchester (Piccadilly and cathedral areas) all told me about their local version of the same thing. Think I'll wander into town now to peer down some gratings…

From John Smiles

With apologies to Peter Laurie for the appalling pun.

Kingsway Tram Subway

When the decision was made by the London County Council to redevelop an unsavoury part of Holborn and to construct Aldwych and Kingsway they considered using the new streets for a tramway to connect the existing northern and southern networks. It was then suggested that instead of running the trams on the streets, a sub-surface line should be constructed as an integral part of the improvement. Similar schemes had been adopted in New York and Boston and a deputation was sent to those cities to see these tramways.

On the strength of their findings an application was made in 1902 for powers to construct a subway for single-deck tramcars running from Theobalds Road to the Embankment at Waterloo Bridge, from which point a surface line would continue over Westminster Bridge. The estimated cost of this proposal was £282,000.

The subway was approved, but the tramway was not authorised beyond the north side of the Strand and it took a further four years for the Council to secure powers.

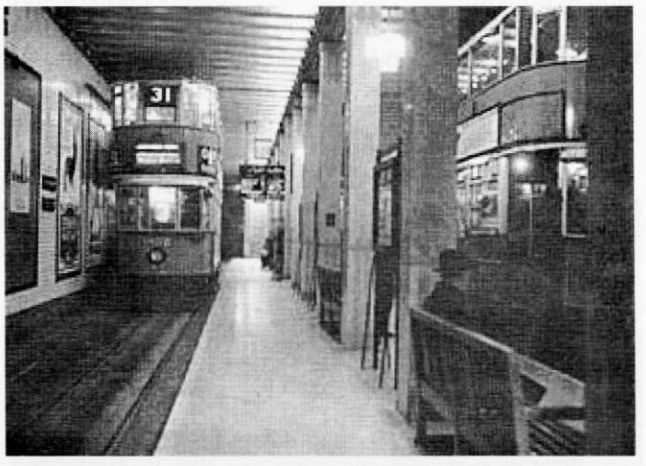
Work on the subway started at the same time as the new streets were laid out. The approach from Theobalds Road was by an open cutting 170 ft. long in the middle of the road. The tracks then passed into two cast iron tubes, 14 ft. 5 in. in diameter and 255 ft. long, which took the line under the Holborn branch of the Fleet Sewer. The rails were 31 ft. below the road surface when passing under Holborn, rising again at 1 in 10 to Holborn Station.

From Holborn to Aldwych the tunnel was 20 ft. wide with a roof of steel troughing just below the street. The running rails were laid on longitudinal wooden sleepers embedded in concrete.

At the time the subway was opened it was not connected with any other electrified route, so it was decided to terminate the public service at Aldwych Station and use the tracks which extended southwards from there towards the Strand as a depot. Inspection pits were constructed under this length and some repair equipment installed. An intermediate station was built at Great Queen Street (later renamed Holborn). Pending the opening of Greenwich power station, current was obtained from the County of London Electric Supply Company.

Sixteen single deck tramcars were ordered from the United Electric Car Company, Limited, of Preston and public service from the Angel to Aldwych began on 24th February 1906, with the north bound journey taking 12 minutes and 10 south minutes for the southbound. The new tramway proved an instant success.

In July 1905, the Council's attention had been drawn to the fact that its compulsory powers for the acquisition of land and easements for the construction of the subway from Aldwych to the Embankment would expire in the following month.



When the Embankment tramway was eventually opened and powers had been obtained for the subway link, work was pushed ahead on the remaining section. This was far more costly to construct than the original length, mainly owing to difficulties in crossing the District Railway. The proposed station at Wellington Street was not built as the Council decided that as the site was only 200 yards from the Embankment it was not needed.

South of Aldwych Station, the tracks curved sharply to the south west in twin tunnels and continued beneath Aldwych as a single tunnel with brick arch roof, separating again at the Strand into twin cast iron tubes which continued to about a third of the way under Lancaster Place. The exit on to the Embankment was through the western wing wall of Waterloo Bridge and here a triangular junction was constructed. The eastern side of the junction, leading towards Blackfriars, was never used and was removed during later reconstruction.

Through services were inaugurated on 10th April 1908, from Highbury Station to Tower Bridge and from Highbury Station to Kennington Gate. There were numerous changes to the routes over the following 20 years.

As the years passed, it became increasingly evident that the operation of single-deck cars could not be made profitable and moreover, if the subway could be enlarged to take double-deckers many useful connections could be given and the movement of rolling stock from north of the Thames to Charlton works would be greatly improved.

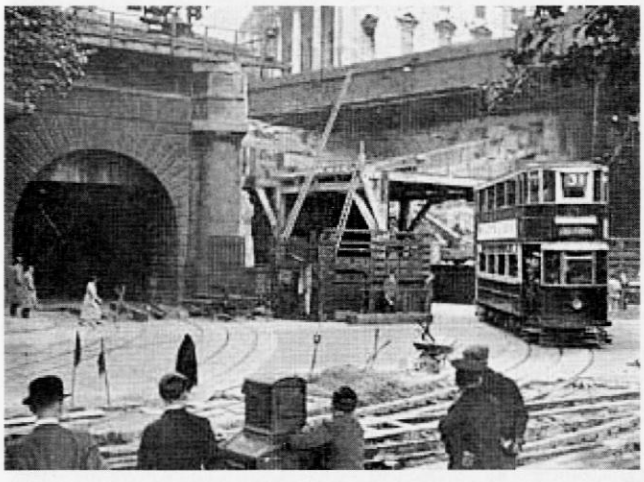
In 1929 therefore, the LCC decided to increase the

Kingsway Tram Subway

headroom to 16 ft. 6 in. by raising the roof at the northern end and by deepening the tunnel at other places.

This announcement brought suggestions that the subway might well be enlarged to take motor traffic as well as trams, but the Metropolitan Police Commissioner pointed out that congestion would arise at each end of the tunnel, that a serious traffic block would quickly develop if a vehicle broke down inside and that there was a danger of exhaust fumes and even fire.

The London Traffic Advisory Committee recommended that the tunnel could serve no useful purpose as a motor way and the L.C.C. would have nothing to do with the idea. The contract was awarded to John Cochrane and Sons, Limited, who



started work on the street level on 11th September 1929.

North of Holborn the roadway was opened up and the twin tunnels replaced by one wide passage with a steel girder roof, while elsewhere the additional headroom was obtained by under-pinning the side walls with concrete and lowering the track by approximately 5 ft. The estimated cost was £326,000 including £76,000 for the reconstruction of the 50 single-deck cars.

The two tramway stations were rebuilt and modernised, that at Holborn being finished in travertine, a cream marble used in ancient Rome. Standard trackwork with yokes and slot-rails set in concrete was used in place of the special type evolved for the original construction.

The formal reopening was performed on Wednesday, 14th January, 1931, by the Chairman of the Council, Major Tasker. Public service commenced at 5 o'clock next morning, with a one-minute headway and a total of 5,000 cars per week.

In 1937, the rebuilding of Waterloo Bridge necessitated the diversion of the subway exit to a position centrally beneath the new bridge, at a cost of £70,000 including a new crossing of the District Railway; after the changeover took place, on 21st November, 1937, the curved section of tunnel leading to the former exit in the bridge abutment was walled off and still exists.

In the mid 1930's work began on the conversion of the London tramways to trolleybus working but the war brought a reprieve to the remaining London tramways and was followed by a decision that the routes still working would be replaced by motor buses and the subway closed.

Owing to a need to replace worn out buses, tramway replacement did not commence until 1950. Finally, on Saturday, 5th April 1952, trams ran through the Subway for the last time.

With the final abandonment of London's tramways on 5th July 1952 the street tracks were lifted in stages and those in the subway were cut at the approaches and left as the longest section remaining in London.

A technical committee was set up by the Minister of Transport to report on the possible use of the subway for motor vehicles, and tests with road vehicles were carried out both before and after closure.

In 1953, London Transport used the subway to store 120 withdrawn buses and coaches in case they were needed for the Coronation and in 1955 it was used to represent a railway tunnel in the film Bhowani Junction.

A film company offered to take over the whole subway as a film studio, but this was rejected on account of the fire risk. Repeated questions in Parliament kept the issue alive, but in 1955 London Transport invited applications for the use of the tunnel as a store for non-inflammable goods, and finally leased it in October 1957 to S. G. Young & Co. of Blackfriars as a store for machine parts.

Meanwhile, in June 1958, the London County Council expressed interest in taking over the subway and creating an underpass for light traffic beneath the Strand and Aldwych to deal with the traffic jams which often extend right across Waterloo Bridge and the new Strand underpass opened to road traffic on 21st January 1964.

It has been suggested that the remaining part of the subway might have been earmarked for some cold war use and as part of their emergency planning in the 1970's the GLC established a flood control centre in a portacabin at Holborn Station in 1974 when they relocated from County Hall. The control centre had its own radio room. They also had an annexe at Russell Square House nearby. Each London Borough had their own flood control centres which would have reported to the GLC's main London Control at Holborn. This remained operational until 1984 when the Thames Barrier was opened.

During the fire brigade strike in 1977 Major General Sir James Eyre was in charge of the deployment of army fire personnel and green goddesses from a temporary underground HQ at Holborn. One night when the Thames rose to within a few inches of top of the embankment he had make rapid contingency

Kingsway Tram Subway

plans to deal with wide spread flooding. It's not known why this civil matter suddenly became a military responsibility.
In Eyre's obituary (Daily Telegraph 9.1.2003) it states that this temporary headquarters was located in tunnels under Kingsway suggesting that it might have been co-located with the GLC's flood control centre. Duncan Campbell states in 'War Plan UK' however that "British Museum Station (disused) is occupied by the administrative headquarters of the Scots Guards and other regiments in the Household Division: in the event of peacetime flooding of London, the London district military command will operate from here rather the war time AFHQ 5 at Beaconsfield."

Since 1984 no further use was found for the subway apart from the first few yards which were used for the storage of road materials by the London Borough of Camden. In Autumn 2003 the northern end of the subway was sold by Camden Council. In early December contractors moved in to clear the remains of the flood control centre and any remaining debris.
This section of the tunnel will be completely refurbished with two new stairways constructed for public access to an underground art gallery which is due to open in 2005.

By C S Dunbar & Nick Catford

Kingsway Tram Subway Trip Report

A very large group of around 70 Sub Brit members met up on Saturday 29th November 2003 at 0930 in Red Lion Square, Central London for a Nick Catford arranged visit to the former Kingsway Tram Tunnel. Inevitably, as soon as we arrived, it began to rain, and I suspect some of those attending wished they had dressed more suitably. Not for the rain, but for scurrying about in an abandoned and dirty tunnel in the metropolis! It has to be said that some came fully kitted-up, but not all…
At 10.00 we were due to meet up with a representative form Camden Borough Council, Mr Gert Van Wyk. A few months earlier, BBC Radio 4's Karen Hoggan contacted Nick asking whether he knew anything about the Kingsway Subway and if so, whether he would do a Radio 4 'You and Yours' interview about it down there. Not a man renowned for being publicity-shy, he immediately saw the potential for spreading the Sub Brit message and the possibility of a further visit. (Sub Brit officially visited this site in 1996). Karen Hoggan arranged all the necessary permission for the radio programme, and Nick duly did the business. Gert Van Wyk was the man from the council, and after Nick asked, made the arrangements for this privately-arranged visit, which having been advertised on the web site and at the October Day Conference, drew many participants.
We walked across the road to the north entrance of the former tunnel at the junction of Southampton Row and Theobalds Road. Once through the large iron gates, we walked down the long cobbled ramp noticing the old tram lines still there. After 50 metres, there was another set of locked gates, which Gert opened for us. Once inside the tunnel, he turned on the lights. The lights had always been there down to the first station, Holborn, but beyond that lighting had been installed a few days earlier – due to the fact that the site has been sold. In fact, the contractors should have been in already to begin work clearing prior to the site work, but deferred due to our visit.
Entering the 'Kingsway Subway' as it was called, it is noticeable how steep the gradient is down to the first station. In the old days the trams got their power from under the ground beneath the rails whilst in Central London, and from overhead lines in the suburbs.
That first section of the tunnel had been used for many years as a store for road signs and general road making materials (stones, bricks and whatever) by the Highways Dept of Camden Council. The main thoroughfare was clear, amply wide enough to drive trucks down there. The tunnel itself was large, 16' 6" high.
As we walked down, we saw that the two tracks (up and down) split with a central platform. I was surprised that the height of the platform was a mere six inches or so. The walls in this station area were tiled with glazed originally cream tiles, with panels for advertisement hoardings. We saw various WW2-style posters that had been put up in recent years for a film. However, evidence of the original posters could also be seen, as small sections of the past remained. The shape of the familiar London Transport roundel was evident on the walls in places.
At that Holborn station there were two stairway exits going upwards to street level some 31 feet above us. still marked 'TO EXIT'. I went up, to find them grilled over at pavement level – in Kingsway opposite the entrance to Holborn tube station in the central reservation. From underneath, these grilles appear totally clogged with leaves.
Along the tunnel there were a couple of fixed steel ladders going up to the roof (i.e. street level) which were made use of by many of the bold. Peering through the grilles at the top, it was possible to work out where I was in relation to the recognisable buildings in Kingsway. The grilles are all in the central reservation.
One side of the platform (southbound) was clear, whereas the northbound line was blocked with a large Portacabin. This was the old GLC Flood Control Centre in the 1980s. (note: it was actually beneath the level of the flood water, as it is only very slightly

Kingsway Tram Subway Trip Report

above river level...) The Portacabin was full of paperwork, and still had the names of the various depts on the internal doors. The paperwork was GLC vintage; Keith Ward had a thorough rummage. Inside, we saw that the Portacabin was divided into various rooms with some names remaining on the doors.

Further into (i.e. south) the subway, we came to the end of the recently installed lighting and at this point crossed from Camden to Westminster. In the darkness, the whole scene immediately took on a far more atmospheric nature. At the end of Camden's area we saw, on the left, a recently installed electrical substation – installled for the new lighting – and this point marked the end of the 'sold' area. This was, approximately, 400m into the tunnel. From here, there was no junk or road mending stores; just the twin tram lines flush with the cobbled floor. From this point, torches were necessary.

After a further 100 metres, there were pillars in the middle of the tracks supporting the up-ramp of the Strand Underpass (finished in 1962). This gradually came down to meet us till it met the floor. The ramp was built inside the old tram subway, and as the road came down, you could get by the side of it. There were two low openings (we had to duck down to get through) enabling passage along the side of the 1962-constructed Strand Underpass roadway. We could hear the cars constantly rushing past on the other side of the wall. The point I'm trying to make is that the Strand Underpass was constructed within the existing tram subway and was slightly narrower hence enabling passage along each side of the 'box'.

At the point we clambered through the 'duck down' openings, we noticed we had entered the site of the former Aldwych station. The walls, again, had glazed tiles and there were remnants of original posters and LT roundels visible. Last used by trams in 1950, it was amazing that there was anything to be seen from that era I thought. The tunnel curved round east, following the line of the Aldwych above. Before I got to the very end, I squeezed down a fairly narrow (1 metre) walkway between the boxed Strand Underpass roadway and the original tunnel. There was standing water on the floor (75mm) and at the end, the walkway ended with a vertical wall above which was a crawl-way which after another 20 – 30 metres became so low as to be impassable. Up there it was dry, and the 'floor' was covered with grit and stone-chips. In the pursuit of knowledge, I opted to wriggle along this abrasive surface 'in case' it led anywhere. It didn't of course...

The Strand Underpass continued on to follow the line of the Aldwych with the down-ramps on the north side of Waterloo Bridge. The original southern subway entrance was beneath Waterloo Bridge, where there are still two large doors in the wall. In the old days, the trams came out of the tunnel under the bridge and turned along The Embankment. This area is now used as a private car park by Westminster Council. The doors are often open, as I notice most days as I ride past.

Every nook and cranny explored, the Sub Brit members slowly emerged from the tunnel and regrouped by the entrance gates. Once everyone was accounted for, the gates were relocked and we returned to our normal lives of blameless obscurity.

From Tony Page

Through the Iron Curtain and back again

During the International Conference at Prague in 1993 (attended by a record number of Subterranea Britannica members) it was suggested to a few of us that we might like to join forces with a few of the Czech caving club for a short visit to sites in Ukraine. Travel would be by train. Ton Breuls and Joep Orbons, of Maastricht, and I all expressed interest. Our visit eventually took place in 1996, so some years after the demise of the old Soviet Union, to the now independent state of Ukraine. Joep, fortunately as it turned out, was not for some reason able to join us.

Getting in and out of what had been a part of the USSR was at least as interesting as the places we visited inside the country.

Setting off without a visa

After several letters, the Ukrainian Embassy in London sent a visa application form, and some 'information for visitors.' Visas for private visits would only be issued on production of a written invitation from Ukraine. Ton's written invitation arrived, and Ukraine's Brussels Embassy issued his visa. My own written invitation did not arrive in Croydon until about a week after I had returned from the visit! The Embassy in London was adamant - no invitation, no visa! I set off anyway. Ukraine has several embassies between London and Kiev! The London embassy's general advice to visitors was succinct: take your own toilet paper, and don't drink the water!

After a day at Ton's place near Maastricht, we took trains via Liège and Aachen to Köln in good time to catch an overnight service to Prague, where it arrived on time early the next morning. The views in the Rhine gorge, with so many floodlit castles, were superb, as were the dawn views of Bohemian limestone scenery just inside the Czech Republic.

In Prague

In Prague, well before the tourist crowds had finished breakfast in their hotels (this is the best time to see the city), we met Pavel Bosak. The visa problem was solved. Pavel speaks Russian (more or less the same as Ukrainian) and it took four minutes at the Embassy to secure a visa at half the price London would have charged. Fortunately, the Embassy was open on Easter Morning, as it was not Easter Morning as far as the Ukrainian Orthodox Church was concerned. At the main railway station we bought outward tickets Prague to Ternopol, and returns Kiev back to Prague. Tickets for the entire round trip, including several nights in bunks with proper bed linen, cost about £ 25 each, so maybe (as Pavel bought the tickets for us) there was still an 'East European' and a 'tourist' rate, Pavel's asking for the tickets in Czech being sufficient to qualify us for the lower rate.

We had the rest of the day to enjoy Prague, before catching the evening train which would traverse the Czech and Slovak Republics in the night, and cross the border into Ukraine at Chop at breakfast time next morning. Pavel handed us over to David Havlicek, with whom we would actually be travelling. The plan was to stay on the train for most of the rest of day two, and get off to meet our Ukrainian hosts at Ternopol the same evening. The train's ultimate destination was Kiev and then Moscow.

At the border station (Chop)

As we arrived at the Ukrainian border, the sun was shining, birds were singing, and a smiling, dishy blonde border guard checked our travel documents, stamped our passports, and welcomed us to her country. We were in! We settled down to breakfast - a sort of picnic breakfast of odds and ends bought in Prague, and some Czech beer which David had persuaded the sleeping car attendant to keep for us in his fridge (alongside his own stock for sale to passengers!)

Then we rolled into Chop Station, where a few people got off, and then on again into a great wasteland of marshalling yards, where the standard gauge wheels would all be removed to be replaced by Russian broad gauge sets. We were rather looking forward to seeing how this was done, when a small man in a trilby hat introduced himself as Vladimir, and announced a change of plan. We would leave the train here at Chop, instead of down the line at Ternopol that evening. We clambered off the train in the middle of the marshalling yards, and walked back along the track to Chop Station.

The station building had been intended to be impressive. The vast ticket hall (almost deserted) had socialist heroes of the people depicted in the course of approved activities (working) in bas relief on mural panels. International train departures were written up in felt pen on bits of cardboard. It was easy enough to decipher the Cyrillic lettering to recognise various Balkan capitals. Glass shelves in the dusty window of a long-abandoned gift shop displayed a few dead flies. If there had ever been a restaurant it had closed.

Valentin's car

Outside in the street we found a dusty shanty town, a kiosk selling chewing gum, and admired storks sitting on chimney-pots. Vladimir introduced us to Valentin and his car, a vehicle which might (*un*-comfortably) have seated four. There were five of us, and had Joep been with us there would have been six. As Joep was not with us, we didn't bother too much with speculating where he might have sat.

We drove off along a very bumpy road which, at first, we thought to be a short cut to the main road, but after an hour or so realised *was* the main road. We stopped briefly to look at the castle at Mukachevo, spending our first 'kupons' (the all-paper Ukrainian

Through the Iron Curtain and back again

currency of the time) to pay to enter. The top floor room had splendid views over the countryside - and an unguarded hole in the floor through which you could easily fall into the cellars. Archaeological items in showcases were helpfully labelled. A large iron key had a Ukrainian label which, the dictionary said, said key. And so on.
It was a very pleasant drive, all morning and much of the afternoon, alongside (and inside) the old Iron Curtain, through a sunny agricultural landscape, with views over the border into Romania. The car broke down every few miles, but Valentin always fixed it. Once we diverted into a small town to find a spare part in a sort of car boot sale of spare parts. We came to the conclusion that Ukrainians don't do lunch!

The salt mine at Solotvina

Eventually, we reached Solotvina, where the idea was to visit a salt mine partly used as an underground hospital ward. We spent tea-time waiting in the main hospital building's entrance lobby, admiring what looked remarkably like bullet-holes in the plate glass windows. Vladimir disappeared and re-appeared several times in the next hour, and we were ignored by passing hospital staff until the Director appeared and seemed somewhat surprised to find an Englishman, a Dutchman, and a Czech camping on his doorstep. It was news to him that we had turned up hoping to visit the salt mine, but he said that should be possible. Vladimir re-appeared. The Director conjured up cups of coffee, and gave us some technical details of the mine. Then we were off on the road again. Entrance to the underground hospital ward was not, as we imagined, by a brightly lit modern lift from within the hospital building. It was by an unlit, rickety, rusty mine cage that spent most of the day hauling tubs of salt up from the lower depths of the mine, and occasionally transferred patients and staff (and on this occasion visitors) to and from the hospital ward. Patients either rest down here in the unlined salt tunnels by day, or sleep down here overnight. The floor was like sand, but of course in fact salt crystals.

Crossing the Carpathians

We were to spend the night at Chortkiv, near Ternopol, on the far side of the Carpathian mountains. It took the rest of the day, and half the night, to get there from Solotvina. As we turned north towards the mountain range, Ton (who had seen no lunch and no tea) suggested we stop 'at the next café'. We reminded him we had seen nothing even faintly resembling a café since entering Ukraine! Valentin and Vladimir took the hint, took good care to park the car on a downward slope, and produced a picnic meal from the boot, We could at this point actually lean against the inside of the 'iron curtain' (a rusty wire fence), or the parts of it that had not collapsed, and admire a very slow Romanian freight train rumbling past on the other side.

Then it was onwards and upwards to a mountain pass. It was now dark, and snow was falling. We were stopped, questioned at, and waved through a police control post - our hosts told us they had warned of the dangerous road conditions in the snow in the pass. It was not until next morning that we noticed the tyres on Valentin's car had virtually no tread! Many breakdowns later, in at times blizzard conditions, we made it through the pass, down the other side of the Carpathians, miles beyond, and reached Chortkiv about three in the morning, where we were the guests of Valentin and his wife and daughters in their home.

Chortkiv and Kamjanets-Podilsky

We were up late the next morning. We went into town for more spare parts for the car (maybe bits had fallen off in the snow?) The surrounding countryside was a mosaic of snow and black mud. My main memory of the town, apart from the black mud and the snow, is of beautifully and recently restored churches with green and golden onion domes, empty shop windows, and unpaved streets filled by a very bustling street market in which all sorts of goods were laid out on large flattened cardboard boxes.
We drove to Kamjanets-Podilsky, stopping to admire a castle ruin perched high up on the side of a river gorge. We passed, we were told, a defunct Soviet missile-launching site.
Kamjanets-Podilsky, an extraordinary medieval walled town sited rather like Durham Castle and Cathedral, the old part being entirely within a loop of the river. Precipitous cliffs, below the walls, made this a naturally secure site. So tight is the loop that there are only a few yards between the upstream and downstream parts of the river. The intervening rock wall has been pierced at river level, and a water-mill inserted, at this point. The only ancient approach to the town was by way of a very narrow road along the top of this rock wall, high above the mill. The outer end of this natural and very steep-sided causeway was guarded by an imposing castle, which we duly visited and admired, although the underground parts appeared to be limited to just a few dungeons.
The real underground objective of the day was a vast underground limestone quarry at Gumci. This is now disused, but a former quarryman turned out to show us around. It was quite an athletic feat to climb over what I recall as being a two metre high gate (this was one of those occasions when it was just as well that we were with the locals.) The galleries are of impressive heights and lengths, strongly reminiscent of those around Maastricht in the Netherlands. Most of the workings we saw had marks on the walls indicating that portable petrol-driven saws had been used. The quarry had been worked after World War

Through the Iron Curtain and back again

ll as a source of material for re-building in the aftermath of Nazi destruction.

The gypsum caves

The local caving club, whose guests we were, is named Speleo-Club Crystal, after their very extensive natural solution caves, in gypsum rather than limestone. These are world-famous, at least amongst the international caving fraternity. The Club has done some excellent work surveying the vast and intricate network of passages, and we had an energetic and sporting trip around those nearest to the entrance of one of these cave systems. Our own equivalent gypsum caves system in England, around Ripon, is not accessible to exploration. A small part near the entrance of one of the Ukraine systems had been worked on a small scale as a gypsum mine. Another system we visited had been used during World War II by persons hiding from the Nazis.

This day we also visited a small rock-cut hermitage, but found nobody at home.

Train to Kiev and the Kiev underground

We took a night train from Ternopol to Kiev. This was a broad-gauge Russian style sleeper train, with everybody sleeping on open shelves. Contrary to our worst fears, we did not find our fellow-passengers to be drunk, loud, or offensive. We ignored a stray American peddling faith (I generally pretend to be Icelandic if abroad and not wanting to be pestered), but had an amiable chat with a 'local' and shared supper with him. It was the most comfortable night I've ever spent on the move.

We arrived in Kiev just in time to sample the rush hour on their very deep Metro - supposedly built far enough down to be secure from a direct nuclear hit. Very impressively clean and beautifully decorated stations, nothing like our own dear Northern Line! Busts of such socialist heroes, I suppose, as were still regarded with a degree of fondness stood in alcoves along the platforms. No graffiti, no litter, and no advertisements. Why do London Transport's passengers make such a pigsty of their own Underground?

Soviet-era sculptures litter the countryside, but the real villains have all been toppled - we were shewn a dump of Soviet leaders and KGB officials discreetly hidden behind the National Museum, their noses in the mud. These are being preserved for posterity, but there are no plans to re-erect them until they can be viewed (like ancient military works) as representative of an event that ought never to have happened.

Our very full day in Kiev took in visits to the two systems of catacombes still tenanted - deceased monks' bodies, mummified and decently covered under cloths, are on show in glass-topped coffins. Although the Soviet authorities treated these as a tourist attraction, they are now very much back in the care of the Church, most visitors being there to pray, not to gawp.

We also saw several more or less empty and abandoned catacombes, and visited the catacombes gallery in the National Museum of History, and met the archaeologists who are surveying and recording them. At one small monastery on the city outskirts we saw a brand-new one-man catacomb, freshly dug by one of the monks, who had set up house in a little cave he had also dug nearby.

By the evening of this, our last day, we had sampled rush-hour crowds on the Metro, and Ukrainian buses, trolley-buses, and trams. That evening, being in terms of the then Ukrainian currency a multi-millionaire, I spent something like five or six million *hryvna* on rounds of beer in a pub for our entire group - there was nothing else I could do with the paper 'kupons' as they are called, which it would have been illegal to export, and un-exchangeable and worthless back in the west anyway. A million *hryvna* in 1996 was about £ 3.80!

The week ended with a splendid dinner in a private home, the small hours drinking vodka and watching Ukrainian television, and a 3 a.m. walk through the City to the Central Station (Vauxhall Centralna) to catch the train back to Prague. This train had left Moscow the night before. It was two nights and a whole day on the train back to Chop, but this time we crossed the Carpathians in comfort, with nice views of the snowy mountains in the sunshine. We noticed that every railway bridge and tunnel seemed to have an armed guard at each end.

Getting out of Ukraine

Getting back through the border to Slovakia was quite a performance. This time we were able to watch the entire wheel-changing process in the marshalling yards at Chop. We rolled into and out of the border station without incident. Then, around midnight, the fun began! The dishy blonde was off-duty. It was snowing. We were in another marshalling yard - powerfully floodlit. Russian / Ukrainian announcements, or more probably orders, echoed from the tannoys on their poles. Armed soldiers, with dogs, were everywhere. They crawled about underneath the train, on top of the train, under the seats and bunks, and took out floor and ceiling panels. The one thing they took no interest in was our luggage. We were ticked off, for not having registered our presence in Ukraine with the local police! Nobody had bothered to tell us we had to, and our hosts were clearly not aware of this requirement. We were half-threatened with being 'put on the next train back to Moscow' and briefly had visions of shuttling back and forth across the huge country between the Slovakian and Russian borders, with about-to-be out-dated visas for Ukraine only! None of this felt particularly threatening, and we felt quite safe leaning out of the windows watching the

Through the Iron Curtain and back again

whole performance. Evidently the searchers found what they wanted, as ultimately a large sack was heaved off the train onto the track, the border lights turned from red to green, and we rolled back to the west - Prague still a whole night and half the morning away.

It was quite a contrast flying back to Heathrow. Only a business class seat was available, so getting back to work the next morning came quite expensive! But the rest of the trip had been at bargain basement prices! My tatty baggage and muddy wellies looked a bit incongruous standing beside the courtesy bar in the business-class lounge at Prague Airport.

Getting from Heathrow back to Croydon took as long as flying in from Prague! The 'official invitation' arrived in the post a week or two after I got back.

Reunion

A few years later, it was marvellous to be able to welcome almost a dozen of our friends from Chortkiv to the Friends of Williamson's Tunnels' International Conference at Liverpool. And two of them came to the following Subterranea Britannica Day Conference at Cambridge, and joined me for lunch and a few beers at my 'local' in South Croydon.

From Paul W. SOWAN

Reigate's caves, mines, and tunnels - a place to celebrate our 30th anniversary?

Reigate (east Surrey) is a surprising Home Counties town. It has a large mining subsidence crater in its central park! Several silver-sand mines, exploited primarily for glass-making sand, can still be visited in the town centre, and have subsequently been used for storing beers, wines, spirits, and (in World I) ammunition. They were once, in part, gas-lit and promoted as a place of entertainment, and accommodated the town band. In World War II they served as air-raid shelters, and a control centre. They are now, in part, home to a rifle club, and opened to the public on certain summer Saturdays for guided tours arranged by members of the Wealden Cave and Mine Society. Access to some of these sites is by way of England's oldest surviving public road tunnel. Reigate's Cold War control centre was in the nearby Town Hall cellars. And all these curiosities, along with a number of enigmatic caves, are to be found below the surviving earthworks and site of a Norman Castle. So many of Subterranea Britannica's members' interests are represented within accessible underground sites contained in an area of central Reigate 300m by 400m that this seems an ideal place to celebrate the Society's 30th anniversary, the actual date of which will be 21 September 2004. We are currently looking at the Saturdays, 18th or 25th September, for such an event - which would be likely to include a tour of the caves (perhaps even with a glass of sherry) and lunch nearby, and perhaps a surface walk at the Colley Hill mining area afterwards.

The Society's chairman, Paul Sowan, will deliver an illustrated lecture on the results of recent research into Reigate's castle, caves, mines, tunnels, and their uses at Subterranea Britannica's next Day Conference, scheduled for 16th October.

Tower Subway, London

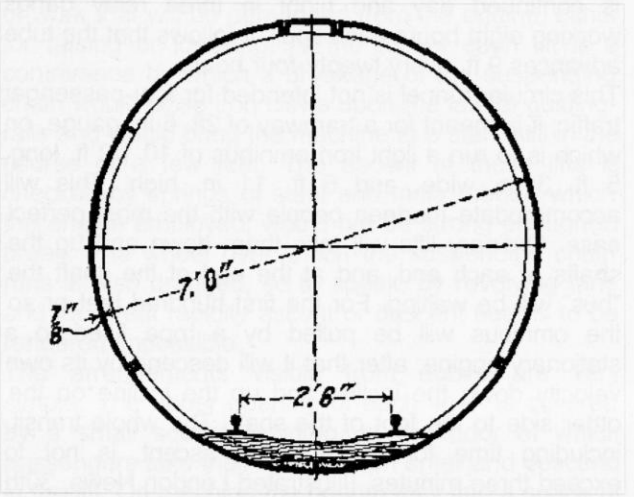
The Tower Subway's chief claim to fame is that it is the world's first tube railway, that is, an underground railway constructed in a tube rather than in a brick tunnel. There are a number of admirable websites already devoted to the Tower Subway (listed at the end of this survey); much of the material in this report is unavailable on these sites, drawn almost entirely from primary sources rather than articles based on earlier articles.

PERIOD DESCRIPTION

The Tower Subway consists of an iron tube, 7 feet in diameter and about 1235 feet in length, laid some 18 feet below the bed of the Thames. It runs between Great Tower Hill on the north side of the river and Tooley Street on the south. It belongs to a Limited Liability Company, and was opened for tramway traffic on the 12th April, 1870. Being a losing speculation, the tram cars ceased to run on 7th December, 1870; but it was opened for foot-passengers (toll, one halfpenny) on the 24th of that month, and the Company has successfully continued it only as such. It is reached at each end by a spiral staircase of 96 steps. The Subway is well lighted up with gas, the average heat by the thermometer being 65 degrees Fahrenheit. Those, however, who are

Tower Subway, London

afflicted with chest complaints should not attempt to make use of it, owing to the extreme closeness of the atmosphere and the limited space in the tube, which renders stooping necessary. It is open from 5.30 AM. till midnight. [Collins' Guide to London and Neighbourhood, no date.]

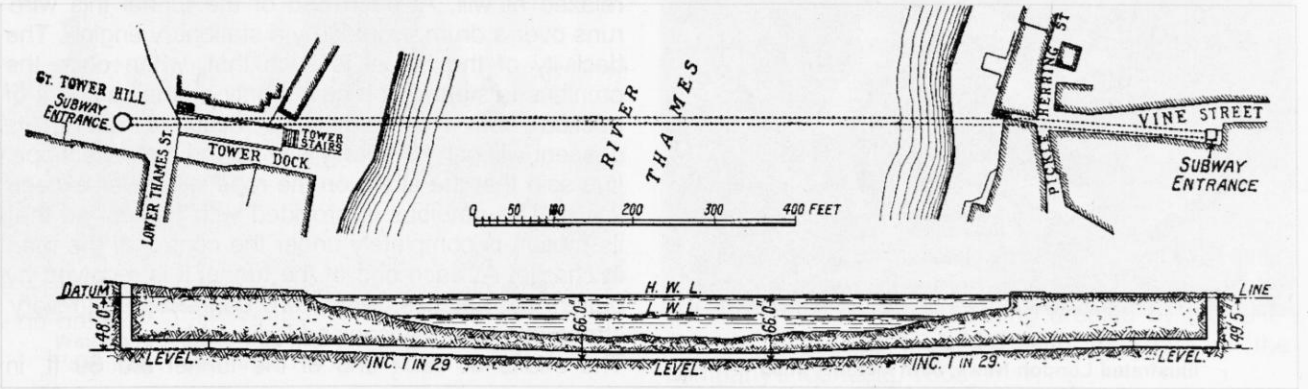


The tunnel commences at Tower Hill, where a hoarding encloses a small square of ground, not larger than an ordinary sitting-room, for which, however, the Government made the Company pay at the rate of about £240,000 an acre. In the centre of this is a little circular shaft, about fourteen feet diameter and sixty feet deep and at the end of this, facing south, a clean, bright, vaulted chamber, which serves as a waiting-room. At the end of this chamber is the tunnel, a tube of iron not unlike the adit of a mine, which, in its darkness and silence, heightened by the knowledge that this grim-looking road runs down deeply below the bed of the river, gives it at first sight anything but an inviting appearance. The length of the whole tunnel is about 1,340 feet, or as nearly as possible about a quarter of a mile. From Tower Hill it runs in a south-west direction, and passing under Barclay's brewery, opens under a shaft similar to that at entering, but only fifty feet deep, and out of this the passengers emerge within a few yards of Tooley Street, close to the railway station. [Old and New London, by Walter Thornbury]

CONSTRUCTION

The works were begun on February 16, 1869, by 'breaking' ground for the shaft on the north side of the river; in February, 1870, numerous visitors were conveyed from one shaft-head to the other. [Old and New London, by Walter Thornbury (1897)]

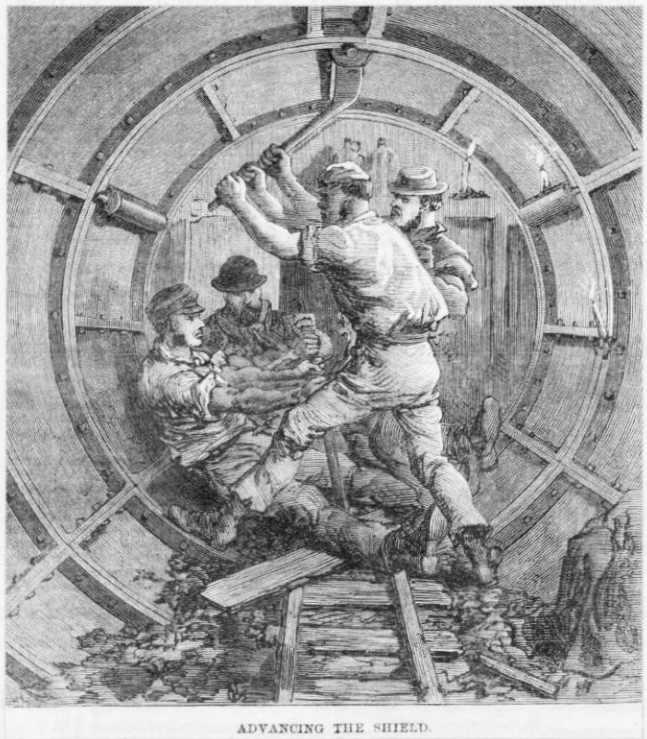
A tunnel, crossing beneath the river from Tower-hill to Tooley-street, near the London Bridge railway station, has been constructed in the present year [1869]. It is not a brick archway, but a circular iron tube, 7 ft. in diameter, laid deep in the clay of the river bed. The engineer is Mr. Barlow, jun., son of the Mr. Barlow who constructed the Lambeth Suspension Bridge. The contractor is Mr. Greathead; and the cost, it is said, will scarcely exceed £16,000. The works, of which we give several illustrations, may be approached from Tower-hill by going down a circular iron shaft, 10 ft. in diameter and 60 ft. deep. The upper part of the shaft is lined with powerful rings of cast iron, the lower part with ordinary brickwork, which will be coated with glazed tiles. There the visitor sees before him an iron tube 7 ft. in diameter, and lined closely along the inside with iron flanges, or rims, nearly 2 in. deep. This tube has much the appearance of one of the large clean main-drainage sewers, except that it is built of iron and has a greater incline and curve. Candles, few and far between, twinkle in the distance and just make darkness visible. The whole length of the tube is 1320 ft. A rather steep incline of 1 in 40, curving from north-east to south-west-that is to say, from Tower-hill to near Tooley-street soon leads the visitor from the London clay beneath the land to the London clay beneath the water, and a difference of temperature between the two is at once perceptible. It is so dry throughout that every drop of water wanted for the works has had to be sent down in buckets. The tunnel, from the north to the south shores, makes a dip to pass under the water, and its line of curve is rather deep. At its nearest point to the river-water it has a thickness of not less than 22ft. of London clay between the bed of the river and the top of the tube, while at its furthest point it has a thickness of 32 feet. Sounds from



Original Plan showing the location of Tower Subway

Tower Subway, London

above are distinctly heard in the tunnel. The shield which is advanced to cover the driving of the tunnel is a light circular piece of mixed cast and wrought iron, weighing 2 1/2 tons, and having an outer diameter of 7 ft. 3 in. The tube of the tunnel itself is built by means of three segments of a circle of cast-iron, each of great strength and weighing 4 cwt., with a centre key-piece at the top weighing 1 cwt. Each segment or ring when bolted together is only 18 in. long, but no fewer than six of these rings are bolted on in every twenty-four hours, so the tunnel is advancing at the rate of 9 ft. a day. As the cap or shield is pushed on for a length of 18 in. it leaves within its tube or rim a space 1 in. greater all round than that occupied by its own tube on the outside. This, therefore, leaves ample room to fit in the segments of the tunnel-tube easily. It is done very rapidly. The bottom segment is laid in its place, and the two side segments above it, and between these at the top the key-piece is slid in. Between the long horizontal flanges a layer of white pine is placed before they are screwed close up and it is to be regretted that some such indestructible material as gutta-percha was not chosen for this work. The spaces between the circular flanges of each segment are regularly caulked in with tow and cement. Still, the shield or cap is 1 in. wider all round than the diameter of the tunnel-tube within it, which comes afterwards to occupy it, leaving an opening of that space between the clay and the iron. This interstice, when the segment-ring is fixed, is closed by pumping in blue lias cement, which, as it quickly sets, forms a ring of stonework, not only impervious to the water—



ADVANCING THE SHIELD.

Illustrated London News, 30th October 1869

for that, indeed, the tube itself is—but impervious to the action of water on the iron tube itself, which is a very important matter. It takes some time to explain all these details, but in practice they are very quickly done. Thus the men excavate the ground in front of the shield, move forward the shield, and fill in another segment behind it every four hours; and as the work is continued day and night in three relay gangs working eight hours each spell, it follows that the tube advances 9 ft, every twenty-four hours.

This circular tunnel is not intended for foot-passenger traffic; it is meant for a tramway of 2ft. 6 in. gauge, on which is to run a light iron omnibus of 10 1/2 ft. long, 5 ft. 3 in. wide, and 5 ft. 11 in. high. This will accommodate fourteen people with the most perfect ease. Ordinary lifts will take them down and up the shafts at each end, and at the end of the shaft the "bus" will be waiting. For the first hundred feet or so the omnibus will be pulled by a rope fixed to a stationary engine; after that it will descend by its own velocity down the incline and up the incline on the other side to the foot of the shaft. The whole transit, including time for descent and ascent, is not to exceed three minutes. [Illustrated London News, 30th October 1869]

OPEN TO TRAFFIC

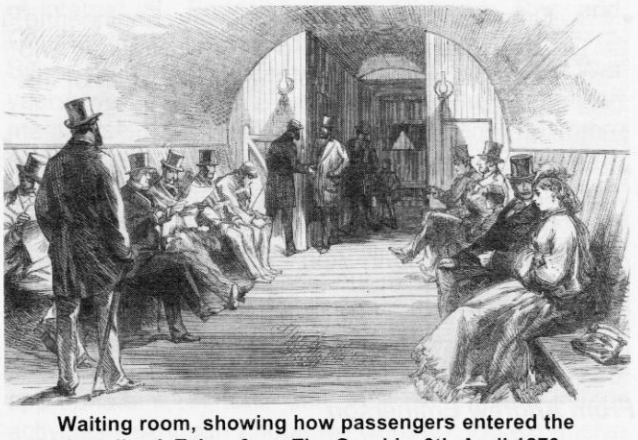
Several illustrations were lately given of the works in progress for the construction of the subway or tunnel under the Thames, from Tower-hill to Tooley-street, Southwark, designed and carried through by Mr. W. H. Barlow, the engineer. It is now complete and ready for traffic. The subway consists of a narrow tunnel uniting two vertical shafts, the mouth of one being on Tower-hill and the other in Vine-street, Tooley-street. The tunnel is lined with iron tubing, bolted together in short lengths by flanges projecting on the internal surface. This tube is 7 ft. in clear internal diameter, or 6 ft. 8 in. between the flanges, and carries a railway of 2 ft. 6 in. gauge. On the railway runs an omnibus conveying twelve passengers. The tube is about a quarter of a mile in length and sinks from both ends towards the centre with a gradient of about 1 in 30; the omnibus is of iron; light, but very strong and runs upon eight wheels. It is connected with a rope of steel wire by means of a gripe that can be tightened or relaxed at will. At each end of the tunnel this wire runs over a drum, worked by a stationary engine. The declivity of the tunnel is such that, when once the omnibus is started, it requires only a small amount of traction and the momentum acquired during its descent will carry it a long way up the opposite slope. It is said that the strain on the rope will never exceed 2 cwt. The omnibus is provided with brakes, so that its motion is completely under the control of the man in charge. At each end of the tunnel it is received by buffers, or catches, which are connected with very strong springs of vulcanised India rubber.

The shafts at each end of the tunnel are 60 ft. in

Tower Subway, London

depth, and are lined partly with brick-work and partly with iron tubing. Within the shafts are lifts, carrying six passengers at once and these lifts are raised and lowered by the same engines that work the drums. Each lift has a counterpoise equal to its own weight and to that of three average passengers, so that the weight of three passengers represents the maximum of work that will be demanded from the engine, either for raising or lowering. At the top of each lift is a contrivance by which a breakage of the suspending chain would close iron claws upon the lateral guiding-rails and would bring the machine to a standstill in the course of a few feet. The ascent of these lifts is checked by springs of steel and India rubber, which the engine employed, would not be strong enough to break. The wheel over which the suspending chain runs is also dragged, so to speak, by revolving fans and too great rapidity ascent or descent seems to be rendered impossible.

The arrangements visible from above are very simple. The upper opening of each shaft is covered by a small square building, at the door of which passengers take their tickets, then enter and descend in the lift. On reaching the bottom they find a space of a few feet between the shaft and the buffers fitted up with benches, as a waiting room. When the omnibus arrives and has discharged its load, those who are waiting step in and start off for the other end. The descent of the shaft occupies 25 seconds and the omnibus journey 70 seconds; so that a passenger may descend into the shaft at Tower-hill and emerge in Vine-street in a minute and three quarters from the time of his descent. Allowing for all ordinary causes of detention, such as missing the lift at the moment of its decent, or being just too late for the omnibus; the journey from point to point cannot occupy more than five minutes. The lifts, as they can only carry half as many passengers as the omnibus, will make twice as many journeys and it is intended to give priority of ascent to first-class passengers, who pay twopence, while the second-class passengers pay one penny. [Illustrated London News, 9th April 1870]



Waiting room, showing how passengers entered the 'omnibus'. Taken from The Graphic, 9th April 1870.

AS A PEDESTRIAN SUBWAY

Although the press launch of the subway was held in April 1870, problems involving the difficulty of signaling between the engine drivers in the shafts and the conductor aboard the 'omnibus' took time to be resolved. Public service did not commence until August. In the event the whole affair was not a success as conceived and operated for barely three months before the lift and 'omnibus' service were abandoned after a number of mechanical failures and minor accidents. The company went into receivership in November 1870 and from then on passengers walked up and down wooden spiral stairs and made their own way through the tunnel. Gas lighting was provided, with stoneware tiles replacing the wooden planks in 1876. A new entrance on Tower Hill was opened in 1871.

Even this slimmed-down operation came to an end once Tower Bridge opened nearby in 1894. Given the opportunity to cross the river for nothing by bridge, people deserted the toll tunnel rapidly and either soon afterwards or two years later (accounts vary) the Tower subway closed to the public for good. In its heyday, however, the subway carried a million foot passengers a year, not bad going.

SUBSEQUENT HISTORY

In 1897, after closure to the public, the subway was sold to the London Hydraulic Power Company (founded 1871), which used it to link its high-pressure mains on either side of the Thames. These mains delivered power to shops, factories, theatres and even car showrooms for powering lifts and other machinery. The hydraulic main through the Tower Subway was laid in 1903, from the Rotherhithe Pumping Station and was used as a feeder main for supply to the City. The Metropolitan Water Board leased space in the subway for two water mains as well (laid in 1898 and 1925).

Use of the LHP Company's services declined after World War II as customers found electric power to be more flexible and the company eventually ceased operation in 1977. In 1981 a group of investors headed by Rothschild's merchant bank bought the 150 miles of pipes, ducts and conduits and in 1985 this was sold the Mercury Communications Ltd, part of Cable & Wireless Ltd. In time some optical fibre cables were laid through the subway.

Electric lighting was installed and vertical iron ladders replaced the wooden spiral staircases in 1926. A near-miss by a German bomb in 1940 caused significant damage to the tube. Emergency repairs were made, enlarging the diameter of the repaired section to 10 ft.

One of the two entrance kiosks, the one on Tower Hill, is still to be seen. It is not the original structure but a 'handsome' brick building erected by the LHP Co. in 1926 and inscribed with the date of the company's founding, 1868

The southern entrance is said to have been

Tower Subway, London

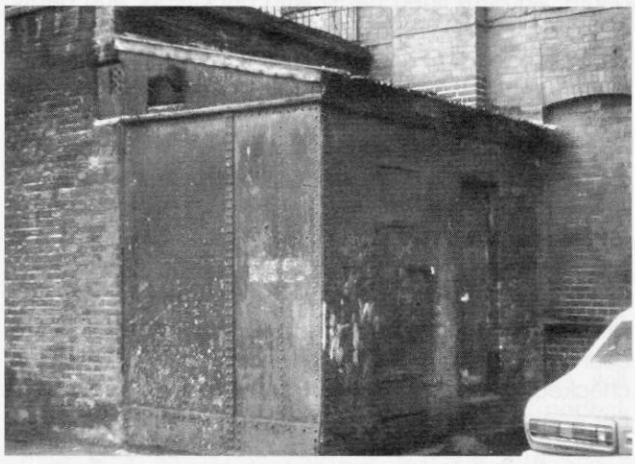
The subway with water mains laid (pre-war publicity photograph of the LHP Co.).

demolished in the 1990s. Roger Morgan recalls: "The original cast iron kiosk in Vine Street survived long enough for me to photograph it for a lecture series I gave in 1978. Subsequently the empty warehouse that it abutted mysteriously burnt down and the wall

The north entrance kiosk in 1968 Photo by Nick Catford

collapsed onto the kiosk, destroying it. Difficult to remember the date, but it must have been about mid 1980s I should think. There is of course a modern replacement still standing in the middle of the building site to the south of Ken's City Hall, and it appears from the published plans of the new 'More London' development that it will be incorporated inside one of the new office blocks."

Photos of the old southern entrance kiosk are extremely hard to find but Roger Morgan had the foresight to take this one:



View looking west of kiosk close up showing iron riveted construction (parasol roof lost). About 1978 Photo by Roger Morgan

FURTHER RESOURCES ON THE WORLD WIDE WEB

- Victorian London website—contemporary descriptions by people who visited the subway. http://www.victorianlondon.org/thames/towersubway.htm

- The most detailed study, superbly researched and illustrated. http://membres.lycos.fr/fdelaitre/Ths.htm

- A handy 'generalist' introduction that puts the subway in its wider engineering context (the London Hydraulic Water Company mentioned was actually called the London Hydraulic Power Company). http://www.bbc.co.uk/education/beyond/factsheets/makhist/makhist7_prog3a.shtml

PRINTED RESOURCES

- The First Tube Railway, by Charles E. Lee. Railway Magazine, Nov/Dec 1943, pp 331-336. Detailed text and photos.

- The Tower Subway: The First Tube Tunnel in the World, by Charles E. Lee. Institution of Mechanical Engineers, 1970. Expanded and updated text.

- Omnibus for the Tower Subway. Engineering, 12th November 1869, p 319. Illustrations and technical description of the rolling stock of this railway.

- Technical descriptions of the work in Engineering, 21st January 1870 and 1st April 1870; The Engineer 18th February 1870, 15th April 1970, 29th April 1870 and 8th August 1870

From Andrew Emmerson

Memories of Subterranea Britannica in the Cold War

Subterranea Britannica was founded, by Sylvia Beamon and others, at a meeting at Emmanuel College, Cambridge, on 21 September 1974. The Cold War (Cocroft, et al., 2003) was already 28 years old, and our first 15 years of development were under its shadow.

Naturally enough, a number of members' interests, especially in connection with former underground slate and stone quarries, and chalk mines, led to the realisation that a number of these, adapted for munitions storage before and during World War II, remained in Government occupation. Several members spent some time studying the maps and plans in a paper on the engineering of underground wartime storage facilities (H. Temple-Richards, 1948) in an at least partially successful attempt to identify the unstated locations.

A large number of the 1930s and later special underground facilities built by and for Government were simply adaptations of pre-existing underground sites, quite extensive details of which (including exact locations) could often readily be found in the pages of, for example, the published *Memoirs of the Geological Survey of Great Britain*, published from 1835 onwards. Most mainland west and east European national geological surveys and major university libraries contained all this published material, so to produce a checklist of top potential secret underground sites called for little more than some hours in the libraries, some good (publicly available) Ordnance Survey maps and plans, and some excursions into the countryside.

My own interest in underground building-stone quarries in east Surrey (which were never used secondarily for anything more 'sensitive' than hearthstone mining, mushroom farming, and the World War II storage of Natural History Museum zoological specimens, and wines and spirits) soon led to my realisation that in locating comparable underground workings for study in Wiltshire I was, in fact, unwittingly putting together a list of sites the Government would prefer us not to take a great deal of interest in! Especially in the Chilmark, Box, and Corsham areas!

Sylvia Beamon has claimed that, during the Cold War years, we had an MI5 'plant' amongst our Committee members! Committee meetings were no more exciting then than they are now! The poor man, if he existed, must have got quite bored, and I imagine rapidly came to the conclusion that we were an eccentric but harmless bunch. I am constantly surprised, in fact, that given our members' undoubted interest in the Government's 'secret tunnels', the Society has never sought as an organisation to grind any political axe. In my view, it was entirely appropriate if, in fact, MI5 took an interest in our activities - although I hope we were not too expensive in terms of resources expended for no useful return!

My interest in the Chilmark quarries (Wiltshire) provided an interesting case study. These former underground building-stone workings originated in the Middle Ages to supply the new Cathedral at Salisbury (13th century) and form the most interesting parallel with the east Surrey Reigate stone quarries at Chaldon and Merstham (which supplied Medieval London) in having no cheap water transport option from quarries to market. The quarries were, until they ceased work about 1937 on being bought by the military authorities, much visited by groups such as the Geologists' Association, and well recorded in the published geological literature.

Once the quarries had been converted by the RAF for munitions storage, of course, they became a 'secret site.' A standard-gauge spur line from the former Dinton Station, on the Salisbury to Exeter main line, was laid into the new RAF site, where transfer sheds were built, bombs being transferred to or from narrow-gauge trains which ran into the two underground quarries within the site used for storage (several others within the perimeter fence seem never to have been used.)

Although any hint of the RAF presence, railway lines, or transfer sheds was kept off the Ordnance Survey maps and plans, this was hardly a terribly secret site! Passengers westbound from Salisbury could easily spot the standard-gauge siding disappearing beyond a clearly enough marked Ministry of Defence gate. The entire RAF site was bisected by a north-south public road linking Chilmark village with Sutton Mandeville. And east-west by a public footpath from Lower Chicksgrove to Teffont Evias. From these public highways, it was possible to watch trainloads of bombs trundling back and forth. Indeed, the narrow gauge line into the main storage quarry passed below the public road. There was a very obvious MoD Police post, and a very large model bomb outside the front gate opposite! I was not at this time aware that the site also contained (from about 1985) a two-storey Cold War bunker.

Whilst missing from the Ordnance Survey's productions, the Chilmark standard gauge branch was generally shewn on atlases published for railway enthusiasts (S.K. Baker, 1980, for example shews freight-only branches labelled Chilmark and Dinton - Dinton was an above-ground MoD storage facility.) Hardly surprisingly, RAF Chilmark received numerous applications from railway enthusiasts anxious for a closer view of the narrow gauge railway - generally politely refused! As some consolation, the RAF allowed a staff member, A.F. Saunders, (1976) to publish an account of the system in one of the railway enthusiasts' magazines.

In connection with my research I ordered a set of Ordnance Survey six-inch maps and 25-inches-to-the-mile plans covering the site, which might well have provoked some interest from an alert security

Memories of Subterranea Britannica in the Cold War

service, even if the plans as expected shew everything inside the RAF boundary fence exactly as it had been before 1937!

Other people with specialist interests were more fortunate in gaining access. The site includes a geological section of major importance, and several sets of underground workings never used for bomb storage but tenanted by hibernating bats every winter. The RAF had probably not had a request for access from a medieval building-stone quarry enthusiast before, and I teamed up with a leading geologist working for the Nature Conservancy Council to arrange a visit.

Shortly after writing formally for permission to visit, and before a reply arrived, I went down on the train to Tisbury Station, and walked over the fields to RAF Chilmark. An unfamiliar man with a brief-case, peering through the chain-link fence, soon attracted the attention of the Military Police, who drove up to enquire what I was doing. 'I'm trying to get in' I said, truthfully enough! We had an amiable chat. I demonstrated a complete lack of wire-cutters or other such implements in the brief-case (it did at the time contain a set of plans of some underground quarries at Caen, in France.) These were examined with interest, as were the contents of my wallet (perhaps fortunately I had not at that time got a Ukrainian visa in my passport!) I assured them that if they checked the boss's in-tray inside the wire, they would find my written application to enter the site through the front gate! Doubtless, if Subterranea Britannica didn't already have a security service file, it did now!

The next week, permission to visit arrived! I met the NCC geologist, and we were met on site by a man with a gun who issued us with heavy duty rubber-cased torches which had stamped on them 'SAFE TO USE IN A CS_2 ATMOSPHERE' or something of the sort. I am, professionally, quite familiar with carbon disulphide, and given the choice would avoid any atmosphere containing this particularly nasty chemical! We were conducted around the underground quarry on the Teffont side of the site, where bomb storage had been discontinued, and where a private firm was quarrying new stone for repairs at Salisbury Cathedral (rather a plus, from my point of view, as it was the stone and the quarrying that really interested me, not the bombs!) We did not go into the main store on this first visit, but we did have a pretty thorough look at all the other underground workings within the site, with interesting contrasts in working methods. We had a welcome break for lunch in the pub in the village.

Whilst giving a short 'members' contribution' on all this at a subsequent Day Conference at Cambridge I was surprised to find the Commanding Officer of RAF Chilmark at the time had joined Subterranea Britannica and was in the audience! He was able to tell us that the radiation warning signs on the perimeter fence did *not* indicate nuclear weapons storage (as Duncan Campbell had surmised) but natural radon from radioactive minerals in the rock. The Commanding Officer and his wife joined the Committee, and attended several study weekends, and indeed we had several committee meetings at their home.

It seemed that our security status was acceptable, and indeed we were able to arrange for a visit to the Teffont quarry at RAF Chilmark to be included in a subsequent Subterranea Britannica study weekend.

The last visit I arranged, for a small group, included (quite unexpectedly) a tour around the inside of the main storage area. We politely ignored the stacks of bombs, each with a rather pathetic looking fire extinguisher standing beside it! This visit was led by Eddie Towlson (of the RAF), who has made a detailed and invaluable study of the quarries and of the buildings in Wiltshire and Dorset and beyond to which the stone was sent. We were so deep in conversation in the Officers' Mess that evening (at the self-service honesty bar) that I missed the last train home from Tisbury, but that was no problem as I found a reasonable hotel near the station, and enjoyed a walk around this very attractive district the following day.

[Paul Sowan has been Chair, and before that Secretary, of Subterranea Britannica since 1976. He is also a member of the RAF Chilmark Association, which is primarily for former staff of the now-closed facility]

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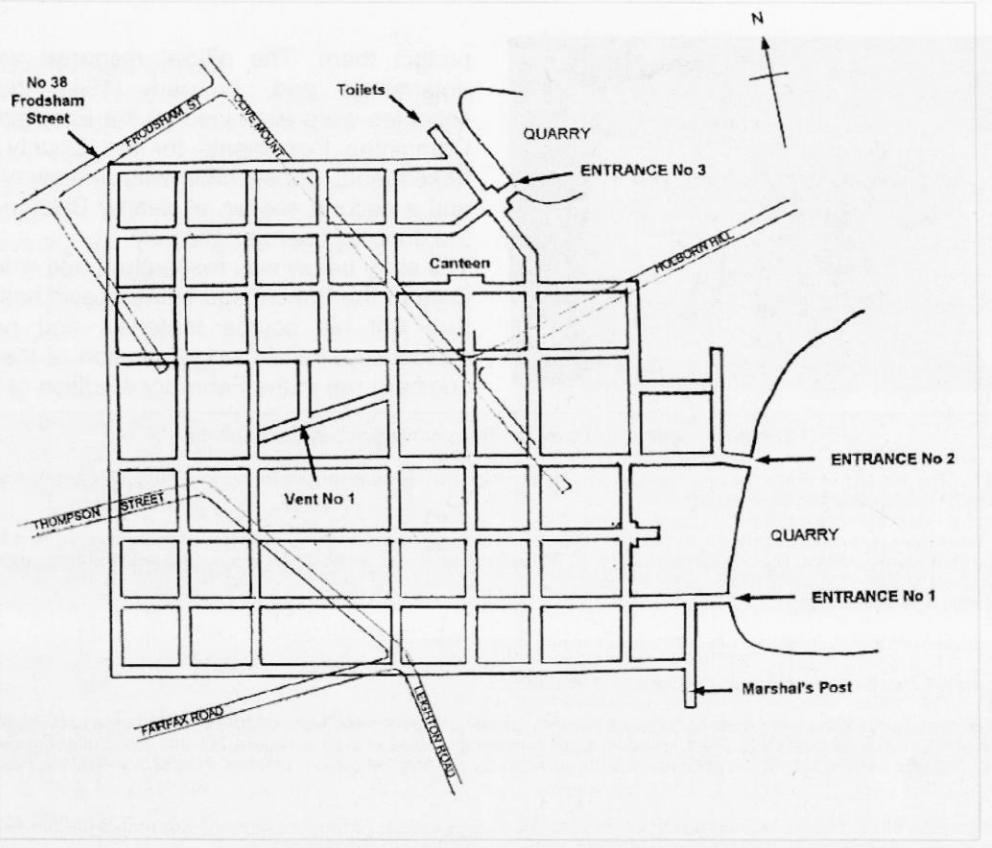
Paul W. SOWAN

An oasis in the fire - the Wirral public air raid shelters



Outside London, Liverpool was the most heavily bombed British city in the Second World War. It was a prime target for attack because, with Birkenhead its 'twin' across the Mersey, it was the country's biggest west-coast port. Every week, ships brought supplies of food and munitions from the USA and Canada, without which Britain could have lost the war.

Following the fall of Norway, Holland, Belgium and France to the German Army by mid-1940, the Luftwaffe had free range over the airfields in those countries and it was from these that German bombers would fly to Merseyside.

With serious losses suffered in daylight raids, the Germans switched tactics to night raids on major British ports and cities. For Liverpool, this campaign began on the night of 28th August 1940, when 160 bombers attacked Merseyside. It was the first of many, the Luftwaffe eventually clocked up about eighty raids on Merseyside all the way to January 1942. These reached their peak in the seven-night blitz in May 1941. The bombing was aimed mainly at the docks, railways and factories, but large areas were destroyed or damaged on both sides of the Mersey.

The bombers followed special radio beams to direct them to their target (the infamous Knickebein navigation beam transmitted from coastal sites on the continent). Although the British sometimes managed to jam or bend these beams, Merseyside was a sitting duck as most raids approached from the Welsh coast and could easily check their position by the lights of neutral Dublin.

As the offensive ratcheted up, over 50 raids were launched in the run up to Christmas 1940. In September and October, they occurred about once every two nights. The shortest were only a few minutes long and the longest lasted over ten hours which must have been terrifying. Most raids were by a few aircraft, but the largest involved over 300. The heaviest raids were on the nights of 28 November, 20 and 21 December – dubbed by the newspapers of the time as 'the Christmas Blitz'.

The combined weight of attacks took a growing toll on the infrastructure of the port and the poor people living nearby in the dense Victorian terraces. By the end of April 1941 buildings, roads and homes had been destroyed throughout the area, over 2,000 people had been killed and total casualties hit nearly three times that figure.

Public fears were exacerbated by the Durning Road tragedy where an appalling series of sub-accidents followed a direct hit on the large underground shelter in the Edge Hill area. About 300 people were tightly packed into a shelter in the basement of Edge Hill Training College when a parachute mine brought down the entire building. The trapped victims were then sprayed with boiling water from the central heating system and burned in the gas fires from the fractured mains. Raging fires above made rescue all but impossible and 166 men, women and children were killed.

By now the bombing was so bad, that even the indomitable optimism of the local people was being eroded. Many criticised the authorities for failing to

An oasis in the fire - the Wirral public air raid shelters

protect them. The official response was slow but determined and, in early 1941, public shelter schemes were examined by the Emergency Planning Committee Documents for the County borough of Birkenhead. Construction was underway by the April and a second shelter, at nearby Bidston Hill, was on the drawing board by the July.

The story below was researched and written by Kevin Core of the Birkenhead News. Kevin has kindly given Sub Brit his source materials and permission to reproduce a rather longer version of the story which originally ran in the February 4 edition of the paper.

Timeline – with quotes drawn from contemporary documents

February 27 1941: "The Ministry of Home Security have the deputy Borough Surveyor's proposals for the construction of deep tunnel shelters in the Tranmere and Bidston Hill districts under consideration. "

March 4, 1941: "While there is considered to be justification for the provision of a tunnel shelter on the Tranmere site, the necessity for a shelter of this type on the Bidston site is not equally evident. The original proposal for 30,000 feet of tunnel is scrapped on the grounds it would take three years.

April 1941: Excavation by blasting begins.

June 19: 529ft excavated. Welder Mr Needham has to move his company from the site of the entrances.

July 14: 942ft excavated. Plan for the tunnel shelter at Bidston Hill formulated.

November 4: Public gain access to the tunnels during raids and to satisfy curiosity. "Owing to various difficulties and delays it is not yet possible to hand over a complete portion of the tunnels for public use. The tunnels are being considerably resorted to by the public, not only during raids but as a regular feature. Notices have been displayed warning the public that tunnels are not yet ready for use and that persons entering do so at their own risk. I view this matter very gravely."

December 9: The principal officer from the regional commissioners office is anxious to deter people travelling long distances to the tunnels for protection. He feels areas should be specifically designated for the streets of Tranmere as soon as they are completed.

January 13: 1942: 6,670ft completed, 148 men employed on the project. Male lavatories ready for use, it has become necessary to employ a Marshal to patrol the tunnels nightly.

January 27: tunnel excavation complete, 140 men employed. February 23: 98 men employed. Installation of bunks begins.

April 28: Ventilation shaft two completed. 121 men engaged.

May 5: Excavation of shaft 3 in progress, this is later deemed unnecessary. Work begins on the "ventilation houses" at the top of the shafts at street levels.

June 2: 100 men engaged. Good progress with brick lining. Work on roofing delayed due to lack of galvanised sheets. The fan destined for the abandoned third shaft is sent to Bidston Shelter.

June 30: Medical aid post and canteen 1 equipped and ready for use. 1500 bunks erected, estimated time to completion is 13 weeks. 90 men now engaged on the project and that number will diminish considerably over coming weeks.

August 11: Total number of men engaged is 53, the excavation of the tunnel shafts are complete.

August 26: "Good progress continues to be made." A petition is received from 25 householders in Redmond Street and Frodsham street, who are upset by noise from ventilation shaft two.

October 27: Three thousand bunks have been installed. The Ministry of Home Security have requested all entrances have double gas proof doors and 25ft is set aside as a library.

Jan 5 1943: Estimated cost £129,699. "The original estimates have been exceeded owing to unforeseen difficulties and the unexpectedly prolonged nature of the operation.

Oct 4: Norman Foods Ltd abandon their plan to use part of the system for storage.

Jan 8 1946: The town clerk has received a letter from the admiralty surveyor of lands informing him that the admiralty propose to requisition the Tranmere and Bidston Shelters for storage of naval equipment. An offer has been received to fix a remote control switch to the marshal's post which will govern the entire shelter.

Feb 26 1947: From the borough engineer: "I submit a letter dated Jan 29 and Feb 24 from the Home office in which it is requested that pending a further examination of the question the tunnels should not be used for storage. No action should be taken to recover salvage. The supply of electricity and water should be maintained and the entrances kept secure."

Sept 10: Home Office agrees to the removal of lavatory equipment and fittings which could be utilised forthwith on housing. "I have therefore contacted Mr Raine with his first contract on the Woodchurch Estate and he is making an inspection to see if they are of any use."

Jan 7 1948: Rental of the tunnels of £500 per annum is agreed with the Mininstry of Food.

1956: Tunnel systems (Bidston Hill also) reviewed for suitability as nuke shelters and Tramere apparently approved by Home Office [although how an unhardened structure full of civilians under a Category A target in the H-Bomb era would have fared under attack doesn't bear thinking about - JS].

An oasis in the fire - the Wirral public air raid shelters

Walk down the tunnels of time

IN THE 1940s the Home Office gave the County Borough of Birkenhead the green light to build the most expensive deep tunnel air raid shelter of its kind in the country. With space for 4560 bunked and 1600 seated occupants, the staggering system below Tranmere reveals the importance placed on local labourers by the government.

Simply put, if Wirral was to play its part in the war effort, the manpower of Cammell Laird and the docks had to be protected from Nazi bombing. One hundred feet below the Fairfax Road, Holborn Hill area, the complex remains a fascinating historical oddity.

Peter Cobb, of the UK Fortifications club, said: "George VI signed a document in 1938 so towns of substantial size would be run by a War Emergency Committee. These committees of a mayor, town clerk and three elected councillors could petition for shelters for the protection of the borough."

"The plans for the tunnels were under the committee's control and, although schematics were drawn up as a matter of urgency in 1941, The Government didn't have to foot the bill until 1943. Birkenhead requested a deep shaft shelter as the work of the nearby docks and Cammell Laird was crucial to the nation as a whole."

Currently held by the National Archive, Cabinet Office document 10131/4363 puts the estimated cost of the venture at £119,000.

The tunnels are remembered by many residents, some with memories of the war, others who used it as a childhood playground. The system was secured, but as the Second World War gave way to the Cold War, the government did not forget it was there.

Home Office document 205/ 371 reveals that in 1956, the year of the Suez Crisis, a comprehensive review of these hangovers from the war was undertaken. It was decided in the event of a nuclear attack, that the Tranmere bunker was capable of being used by the public, but a second system under Bidston was not capable at short notice due to rotten supports.

In the post-war rush to utilise resources, the system was stripped, but the signage and brickwork remain. The many toilets were salvaged and given over to the new housing development in the Woodchurch Estate.

Vast Network Under Our Feet

ONE of the many people fascinated with the tunnels is Robin Newby. He said: "I was a member of the Grosvenor Caving Club and we were all interested in the news that information had been released under the 30-year rule about a bunker-like system under Tranmere. I then contacted Rod Tann, the emergency planning officer at Wirral Council, who is in charge of the plans.

"My consideration was to check the entrances and put a proposal forward to develop the system as a tourist attraction. Stockport has successfully used

such a system in this way -- so why not Wirral?"

"The plans show three entrances. One has been grown over and the other two are safely inaccessible. In late 2001 Rod showed me pictures taken in 1988, the last time the fire brigade had been in. To my knowledge since then it has been completely unused."

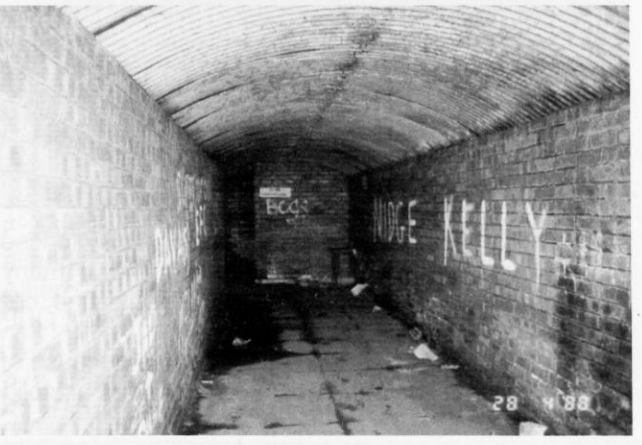
"Because of this we do not know what the protocols for how this place would have been used are, but the contractors would have certainly signed the Official Secrets Act. It is fascinating that beneath everyone's feet in Tranmere this network is locked away, and was never used for the purpose it was built."

Rod Tann said: "It is in an ideal position because the quarry could have taken the spoil from the excavations and it automatically gave you the necessary depth."

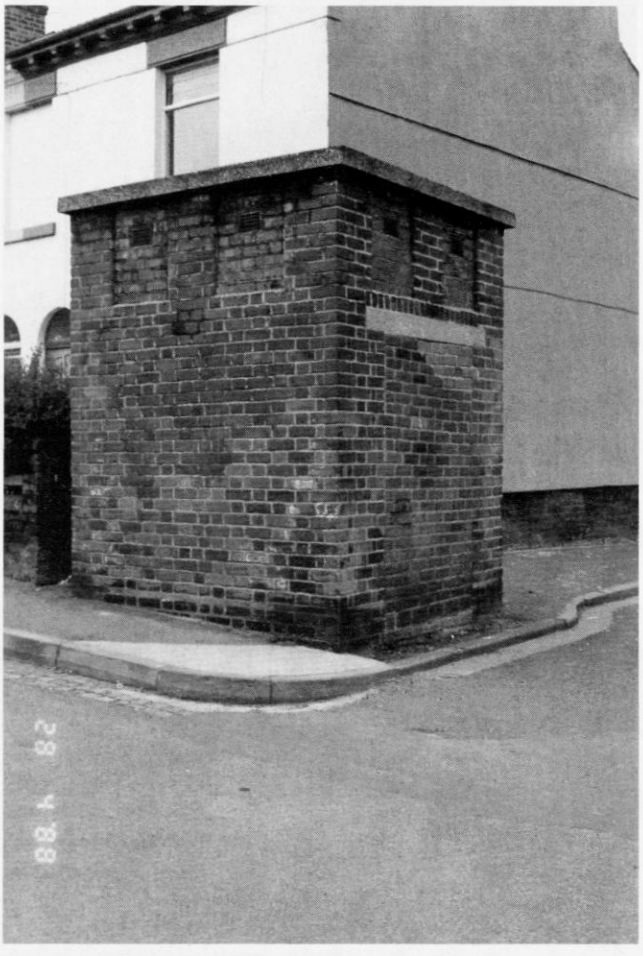
Why architectural oddity was sealed off for safety

THE tunnels were a magnet to the adventurous - but experimental sections of the sealed area's roof contained asbestos. So in 1988, action was taken to bar access to the tunnels for good. Peter Dowling, of Merseyside Fire Brigade, was among the crews which braved the tunnels to make a final sweep before all the entrances were sealed.

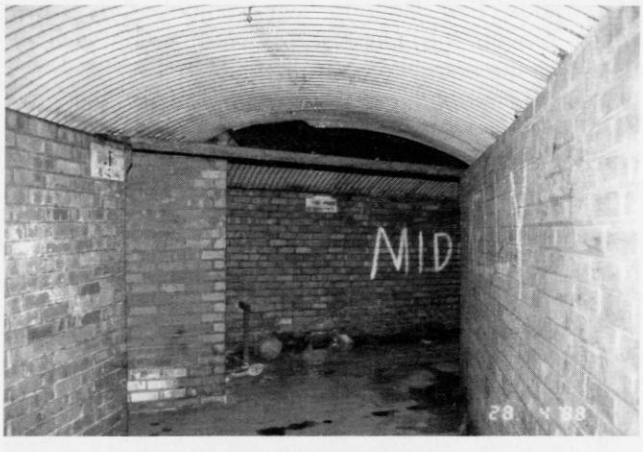
He said: "That summer the kids had been getting in there and really making a nuisance, so the council contacted us. Our job was to do a thorough check to make sure no-one got sealed in."



An oasis in the fire - the Wirral public air raid shelters



"It was a big job. There was no way you could do it without a few crews, so we flooded it with men and held on to guide ropes. Obviously, none of the internal lighting system worked, so we had to take



our own lighting. It would have been very easy to lose your bearings. We were counting how many passages were branching off so we could find our way back"

"Also, we had to take breathing apparatus because of the possibility of methane gas. The thing was as solid as a rock, really well made and you could see where all the bunks would have been. Some time later I was called out to look at a three-foot-square manhole on land near Fairfax Road. It turned out to be a 100-foot deep ventilation shaft which could also have been used by people in the shelter as an emergency exit."

One Wirral resident recalled a search for her son and his best friend who disappeared when they were 12 in 1982. The army was called in to look into the tunnels and the boys were found after 26 hours missing. They told their mum they had seen a canteen and toilets, but she originally did not believe them, until one of the officers informed them it was true. She said they came out black with dirt from head to foot. Interestingly, the lack of light meant the boys, in their panicked state at having got lost in the complex, believed they had been down there for three days. Local residents in the 50s remember gaining access and jump starting the lighting system with car batteries!

The Shelters Today

Whenever we run a site story in Subterranea, the inevitable questions about access come up. I am happy to report that Tranmere and Bidston shelters are both works in progress in terms of a Sub Brit visit and we are actively negotiating with the EPO for access. He is keen that we should get in but has been unable to persuade the right people just yet, so watch this space.

One of the blocked entrances is on private land and the owner has agreed that we can knock a hole in the wall and then repair it so long as we have the Council's blessing. We have a contractor ready to do the work and even a local member who's willing to pick up the bill!

The site is secured regularly, although local members tell me that the lure of the tunnels is too great to stop the Borough's youth from regularly raiding their dad's shed for the tools to break in. If you do find it open, please exercise caution and bear in mind the asbestos hazard.

John Smiles and Kevin Core

Constitutional changes proposed for Sub Brit

The Committee of Subterranea Britannica is considering recommending the membership that we should seek to register the Society as a Charity, and as a Company limited by guarantee. It is increasingly common for larger societies to adopt charitable and limited liability status. The Wealden Cave and Mine Society, for example, is already a registered charity, and is actively considering incorporation. The Peak District Mines Historical Society is both a registered charity and a company limited by guarantee. Your Chairman has acted as company secretary and charity trustees' correspondent on behalf of the Croydon Natural History and Scientific Society for many years - the Society (founded in 1870) has been a company since 1967, and a charity for some years before that.

Incorporation, for voluntary organisations, is generally seen as a sensible move where considerable assets are held, or where officers and the managing committee may be potentially exposed to unusually costly claims in the event of accidents involving third party persons or property. Although we have succeeded (at an increased cost) in securing third party insurance cover, your Committee members feel that 'limited liability' would be well worth having. The limitation of liability by guarantee (no shareholders are involved) would mean that the Society, as an incorporated body, would have a legal identity of its own, able to sue and be sued. As an unincorporated association, as now, this is not the case - persons wishing to sue for damages would have no alternative to suing individual officers or committee members. Very large claims would put people's ownership of their homes at risk. With limited liability, a large claim against the Society might have to be met by the surrender or sale of all its assets. In the event of these being insufficient to meet the claim in full, the liability of members would be limited to a nominal sum (usually £ 1 each) which it is necessary (on incorporation) for them to agree to pay in the unlikely event that this were ever to become necessary.

Charitable status would be a pre-requisite to incorporation as a company limited by guarantee, and additionally of course has helpful tax implications and may well be helpful in connection with securing grants from public or private funds, negotiating access to sites, and so forth.

The likelihood is that members will be asked at the next Annual General Meeting to approve our applying for registration as a charity, as a first step, worthwhile in its own right, in the proposed direction. More detailed information will be mailed to members in due course.

Meanwhile, members may like to know that they can discover more about charitable status and about incorporation by visiting the Charity Commission's website ***http://www.charity-commission.gov.uk*** and the Companies Registration Office website ***www.companieshouse,gov.uk***

Paul W. SOWAN - CHAIR

2005 NAMHO Conference

The Conference of the National Association of Mining History Organisations will be held at Juniper Hall Field Centre, Mickleham, near Dorking, in east Surrey, on the northern edge of the Weald on 8th - 10th July 2005.

Dorking and Mickleham are about 30 km south south west of London, with direct trains from London Victoria and Waterloo stations (journey time about 70 minutes.) Dorking Deepdene station also has hourly direct services from Gatwick Airport (journey time about 25 minutes.) Juniper Hall is about 1.5 km from Mickleham Station. Exact location maps can be had on request. We will collect you from the station by prior arrangement.

Organised by the Wealden Cave and Mine Society with the assistance of the Chelsea Speleological Society, Kent Underground Research Group, and Subterranea Britannica The theme will be Mines, quarries, tunnels - south-east and beyond

There will be a programme of lectures, and surface and underground trips focusing primarily on medieval and post-medieval underground building-stone quarries, chalk mines and underground quarries, mineral pigment (hearthstone) mines, silver sand (glasshouse sand) mines, and the Wealden ironstone mines and associated surface remains.

The Weald and its surroundings has also had Neolithic flint mines, fullers' earth mines, Kentish ragstone underground quarries, and coal mines (in east Kent.) One gypsum mine remains operational in the Weald.

Colleagues from mainland Europe, especially from Belgium, France, and the Netherlands, where mining and underground quarrying have been carried on in a similar geological context, are being invited.

For further information or to register an interest in attending contact Or telephone or write to Robin Albert, 13 Beaufort Road, REIGATE, Surrey RH2 9DQ (telephone +44(0)1737-243912)

Website: ***http://namho2005.wcms.org.uk***
Email: ***namho2005enquiries@wcms.org.uk***

Who Runs Sub Brit?

Professor C.T. Shaw - The Honorary President

Professor C.T. Shaw, Ph.D.(Hon.), C.Eng., B.Sc.(Eng.). M.Sc.(Applied), FIMMM, FSAIMM, FIQ

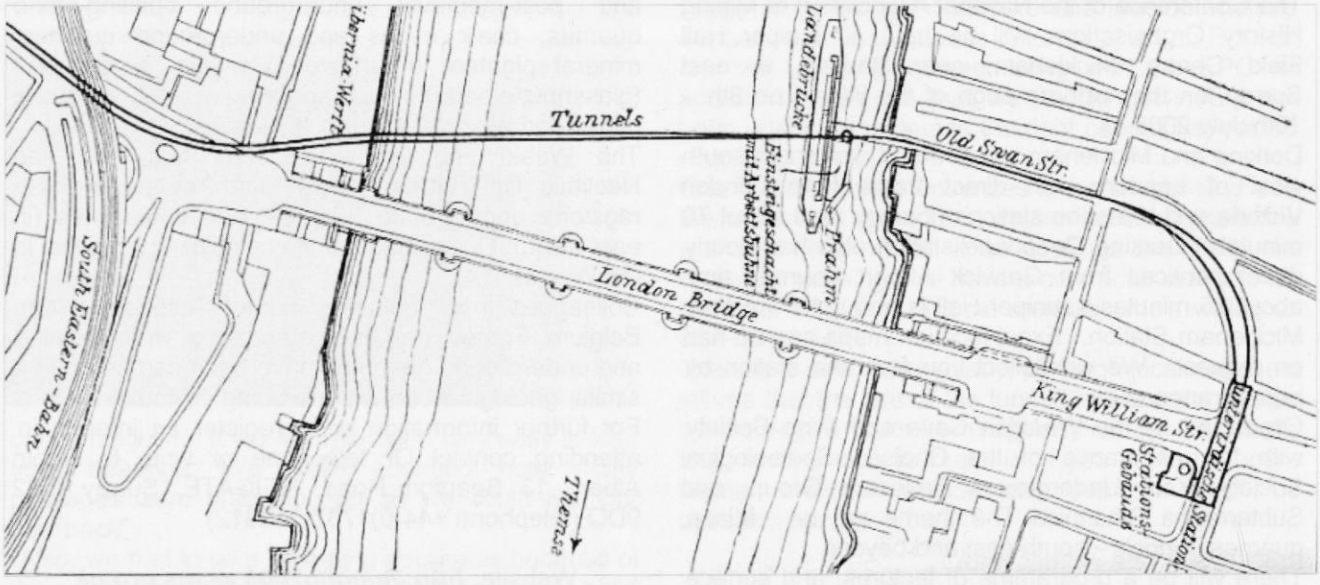
Tim Shaw was born in South Africa, on a mine, rather more years ago than he cares to remember. He was sent to boarding school in Cape Town and then went to the University of the Witwatersrand to study mining engineering. On graduating with his B.Sc. (Eng.) in Mining Engineering he was not yet ready actually to go to work, so he went off to McGill University in Montreal in Canada to do a Master's degree in Mineral Exploration. Having run out of excuses for not working, and being short of people prepared to fund further idleness, he returned to South Africa and started work on the mines with the Johannesburg Consolidated Investment Co. group of mines. As they were short of other graduates at the time he rose rapidly through the ranks and ended up as Chief Consulting Engineer to and an alternate Director of that company.

At this point he made a review of his future, decided what was ahead looked too boring, and so changed tack entirely, left his job, left South Africa and emigrated to the United States and took up a post as an Associate Professor of Mining at Virginia Polytechnic Institute and State University in Blacksburg, Virginia. After three years there the Royal School of Mines in London offered him a full Professorship and to come there as head of the Department of Mineral Resources Engineering. So he did.

Since then he has held various posts at Imperial College, of which the Royal School of Mines is a part, including Dean of the RSM. He has also done consulting work all over the globe, and has generally enjoyed life. He has been a founder member of and the Secretary General of the Society of Mining Professors since 1990. Being in London, and being interested in ancient mining, he not only worked at Imperial but also hooked up with the Institute of Archaeology at University College, where he taught courses in ancient mining and for the last three years has been an honorary professor.

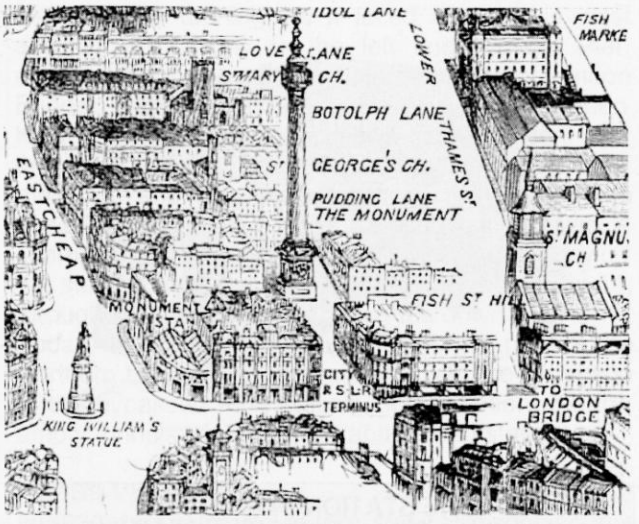
King William Street Station

Although there are a number of admirable websites devoted to the King William Street station, this article does not duplicate them. So if you want to find out more (and something new!) about this short-lived and long-forgotten tube station jump aboard now...
First of all, let's get orientated and see the place we are talking about! This plan shows the relation of the tunnels to the Thames, also the underground platforms at King William Street to the surface buildings. Also shown is the temporary access shaft and working stage built next to the Old Swan landing stage.



Source: Die Londoner Untergrundbahnen, Troske (1892).

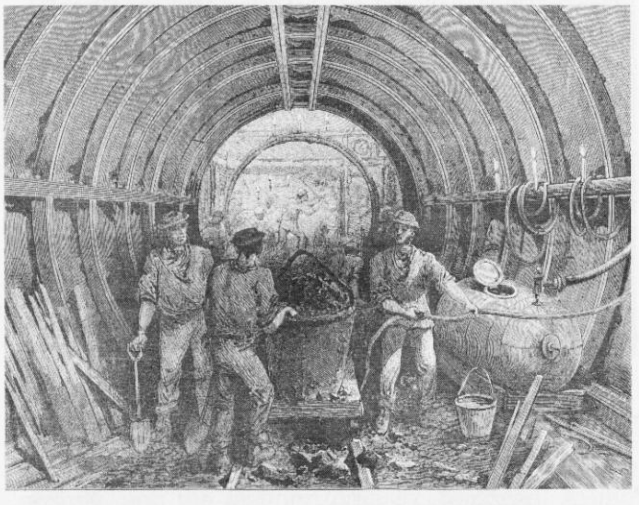
King William Street Station



The rounded corner block with the entrance to King William Street station is seen clearly in the first of these two aerial views (the second one shows only the rear of the block!). From London Illustrated by Twenty Bird's-Eye Views by Herbert Fry (1894).

SIGNIFICANCE:
The station's claim to fame comes from the railway that built it, the City & South London Railway (originally Subway). This was the world's first electric tube railway (but not the world's first tube railway—that honour goes to London's Tower Subway—nor of course the world's first underground city railway, London's Metropolitan Railway, originally run with steam traction). The other significant issue with King William Street station is that it was in use for only a short time, although it found use as an air raid shelter during World War II.

CONSTRUCTION:
The caption for this engraving reads:



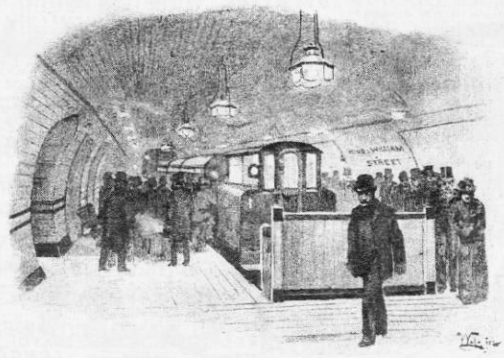
THE CITY AND SOUTH LONDON SUBWAY. An underground railway from King William-street, City, passing beneath the Thames to Southwark, and thence to Newington-butts and to Clapham, is now being constructed. One tunnel has been completed from King William-street to St. George's church in Southwark, the first station south of the Thames. The second tunnel is almost completed for the same distance, with the exception of about 100 yards. Both tunnels are being pushed forward towards the Elephant and Castle, and the works for the station there, and the stations at King William-street and Great Dover-street, are in hand. At the terminal station at Stockwell sinking operations will also very shortly commence. The means of access for passengers, between the level of the underground railway and the level of the streets, will be hydraulic lifts, two of which, each to take fifty persons, will be at work at each station. There will also be steps at the stations. As the carriages are to be drawn by wire ropes, working from a stationary engine, the atmosphere should he much fresher than in the tunnels of the Metropolitan Railways north of the Thames. It is hoped that the first section of the line will be opened for traffic in the summer of this year. [Illustrated London News, 3rd March 1888]

The line was originally called a 'subway', probably to avoid the negative connotations of the smoke-ridden atmosphere of underground lines then worked by steam locomotives. The name was picked up in America, where it caught on and is still in use for what we British rapidly went back to calling an underground railway. The notion of using rope haulage was abandoned some time before the line was actually opened.

THE CITY & SOUTH LONDON RAILWAY ITSELF:
The line was inaugurated on 4th November 1890, from King William Street to Stockwell. The Prince of Wales, afterwards King Edward VII, performed the opening ceremony. On 18th December the line was opened to the public. Less than ten years afterwards the line was extended northwards to Moorgate Street and when this was opened on 24th February 1900, new tunnels were brought into service from theBorough and the original section abandoned. The old city terminus was most awkwardly placed as

King William Street Station

ELECTRIC RAILWAY STATION (CITY AND SOUTH LONDON), KING WILLIAM STREET

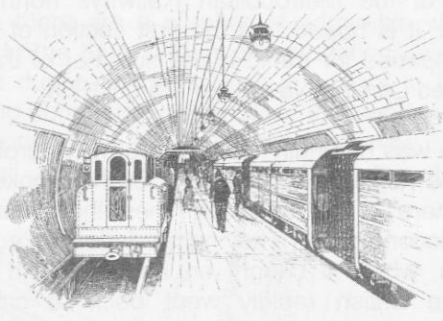


ELECTRIC RAILWAY STATION (CITY AND SOUTH LONDON), KING WILLIAM STREET

THE STATION IN USE:

Not many illustrations survive of the station in operation but here are two, both from the book London City (published in 1903).

This is the original layout of the station, with one track and two platforms (for departing passengers on the left and arrivals on the right). This was altered to two tracks and a single island platform on 22nd December 1895.



This is Stockwell station, not King William Street, but we have used this picture because it illustrates rather well the so-called 'padded cell' coaches and the small 4-wheeled electric locomotives that hauled them. It was assumed passengers would have no interest in looking out at blank tunnel walls on their journey, so only small slit windows were provided. The name of each station was called out when the train stopped. Passengers entered and left these carriages through the 'lift gates' operated by 'gatemen'.

AFTER CLOSURE:

Although the subject of this postcard is the Monument the boarded-up entrance to the old station is visible at bottom right. One of the posters appears to be advertising trips to Paris and the sign inviting people to book here for Royal Sovereign may be for steamer trips.

King William Street Station

regards train running, as it faced almost due west and curved sharply to the left under Swan Pier, crossing the river under the up-stream side of London Bridge. There was no intermediate station between King William Street and Borough, which meant that there was no interchange station for London Bridge main line and suburban station. In the case of the down line from King William Street this involved a sharp curve and a gradient of 1 in 30 upon leaving the station, while the up line was still steeper, 1 in 14, through the up line crossing over the down line.
Today the City & South London forms part of the Northern Line of the Underground, with the exception of the bypassed King William Street station and the empty tunnels leading to the abandoned station.

PRESS VISIT 1930:
In 1930 the Underground took steps to dispose of the old station building at King William Street and shortly after this, the old station and office buildings were demolished to make way for a new block known as Regis House. Before this happened, however, the eminent transport historian and journalist, the late Charles E. Lee, paid a visit to the station in 1930, along with the Daily Mirror. Most likely this press tour was instigated by Lee and then taken up by the Underground. In addition, on 28th March 1930 a number of official photographs were taken and these are still available for purchase from London's Transport Museum. Being copyright, they are not reproduced here but they are superb. This is Lee's description of his visit (Railway Magazine, September 1930, pp 197-199).

The present means of access is through what was formerly the emergency staircase, and this is reached from a cellar under 46, King William Street, the premises which constituted the booking office of the original terminal station. Descending this gloomy circular stairway by the light of two acetylene flares, our party reached the old platform level with the feeling of having turned black a page of history and recalled those sensations, forgotten by the present generation, which were experienced by the inaugural party through this, the world's first electric tube railway, some forty years ago. As now existing, the old station still retains sufficient traces of its former equipment to enable a fair idea to be gained of its working condition, although the tracks have been entirely, and the platform partially, removed. At the platform level the station consists of a circular brick tunnel, with a centre platform and the sites of the lines on either side. Openings give access to the old lift shaft, which formerly contained two hydraulic lifts. The shaft has been covered over and the top portion now is utilised for shop premises. Remains of gas fixtures are a. reminder that the stations were lighted by gas during the first ten years of the railway's existence, electricity being introduced gradually thereafter. at first only on the newer stations. The 'King William Street' station names are still in position in two or three places. At the end of the platform is the remains of the signal box. still containing its 22 hand-operated levers. Three of the two-position semaphores are in position. one, at least. of which it may be hoped will be preserved in the company's museum. Beyond. the station the brick tunnel ceases and the line enters the two iron tubes. Our party proceeded along the left-hand tube. The point where the other tube crosses over is easily noticed. and the two tracks are connected by an iron ladder. Further on we joined the other tube through a narrow connecting passage on the left. and returned to the station. At the mouth of the tubes a much faded board can still be deciphered, notifying "Speed not to exceed 5 miles per hour." Although all traces of the surface station equipment have long since disappeared, this glimpse into the past may be completed by adding that the original charge of 2d. ordinary fare for any distance was collected by means of turnstiles; and that this system was maintained until the extension to Moorgate Street made it necessary to introduce fares graduated according to distance.

A NEW ROLE IN WW 2:
Transport and communications enthusiast Alan Gildersleve states: "I slept many times in the former King William Street station under Regis House, where my father worked. I was there the night the bomb fell on the Bank station and the tunnel really rocked. The King William Street station was used as offices by the United Dominions Trust and I was intrigued by the PAX extension number 00. Obviously the last remaining spare line circuit in a 100 line PAX! The two running tunnels at the end were toilets apparently running all the way to Borough. One male and one female. The air conditioner made such a noise that when it switched off at about 5 a.m. the sudden silence woke you up! That part that I slept in was north of the Thames, and the only access of which I have any knowledge was from the basement of Regis House (corner of Monument Street) via the standard spiral tube station staircase. This comes out into a double track sized tube tunnel which was much larger in diameter than a normal tube station and then a large office and full of desks and filing cabinets, between which we used to put up camp beds. It was obviously right next to the running tunnel as we were aroused each morning by the trains starting to run apparently just the other side of the wall! I visualised the new tunnel as running parallel with the old one but apparently, from your map, this was not so. As I said, the two normal sized tunnels ran on from the end of this large one and they were closed off with doors, one marked 'Ladies' and the

King William Street Station

other marked 'Gents'. Presumably they continued on to join up with the under-river bit. It's a good job that no bomb fell in the river bed! I used to spend the evening with my Father in a store room in the basement, listening to some one else's gramophone up the passage playing The Breeze and I, If I should fall in love again and particularly A little dash of Dublin. I now have copies of these records (on 78) and they really bring back memories. About 10 p.m. we would make a cup of tea, eat a sandwich and go down to the tube station for the night along with several other employees most of whom belonged to the United Dominions Trust. My Father worked for Watts Watts and Co., who ran merchant shipping and whose ships were mostly named after London districts such as Twickenham, Dagenham and even Dulwich. He was a scrutineer keeping an eye on the invoices which were being received and to see that the firm wasn't being swindled!"

Roger Morgan clarifies: "The Northern Line crosses King William Street station at right angles as I remember, close enough to hear the trains evidently. There was a second stair shaft (maybe this was built post-war but that seems unlikely) at the running tunnel end of the station into the basement of an office block on the other side of the road to Regis House, which has now been filled with concrete on its redevelopment. Now (or at least in 1978, when I did) you could pass through the toilets and into the under-river section (through the construction shaft), streaming water and stalactites, and then through a door in a grille into the Southwark shelter. I and Harry Pearman walked from King William Street to Borough."

SUBSEQUENT EVENTS:

When rebuilt in the early 1930s, Regis House retained the same quarter-round profile as the older structure. Occasional visits to the old station in the basement were permitted and photographic records of two such explorations can be found on the world wide web (see end of article for links).

A press visit was arranged in 1992 for Railway World magazine (April 1992 issue, pp 44-45), in which the late Handel Kardas says inter alia: "The station, was adapted as [an] air raid shelter in the war years, losing its character in the process. The large single-arch lost its platforms and trackbed and the space was filled with two stories of rooms. These are still there, falling into decay, but the original structure seems as good as ever. Unfortunately they make the old station practically impossible to photograph. Access to the station for maintenance and inspection purposes by London Underground Ltd engineers, is through the office block. In a fashion reminiscent of the opening sequence of The Man From Uncle or similar lightweight 1V spy series, staff enter the building at ground floor level and descend two floors. From there they take a short staircase further down still, to an innocuous-looking locked door. This gives access to another world of old, musty tunnels and twisting stairways, which show that this pioneer station was remarkably like many later ones in general design. Much of it was originally tiled and the L T Museum has had several sections of tiles professionally salvaged for preservation. Soon, redevelopment will start and this remarkable survival of the first ever tube line will be lost forever."

A letter from M.E. Mawson of Edenbridge in the following issue took a more positive line, stating: "I do not understand how the old King William Street terminus may disappear with the forthcoming redevelopment, because it is not underneath Regis House but crosswise to King William Street and ending below the side street towards the monument. The spiral steps are beneath the pavement therein, while the lift was indeed in the building confines and filled in solid when the present block went up. Surely London Underground Ltd will retain access via the basement of any succeeding premises."

ESSENTIAL READING:

Bancroft, Peter: The Railway to King William Street and Southwark Deep Tunnel Air-Raid Shelter. Self-published, 1981.

Regis House appeared like this in 1993, with the Automobile Association's name above the door.

Further resources on the WWW

The most detailed study, nicely researched and illustrated.

http://perso.clubinternet.fr/fdelaitre/Kws.htm

From Andrew Emmerson

North Korea's Ace in the Hole

SEOUL — Like so many worker ants, the North Korean soldiers spent their days underground in a vast labyrinth of tunnels.

Their daily commute involved walking down four steep flights of stairs, then passing through a corridor that went nearly 800 yards into a mountain. They carried tightly sealed cartons, believed to contain raw materials for North Korea's secret weapons programs. Some days, especially if they were being punished, they were assigned simply to dig more tunnels.

K., a North Korean in his 30s, was recruited at age 17 into an elite military unit working for the agency responsible for weapons production. He took an oath to work underground for the rest of his career and was assigned to a cave in remote Musan County in North Hamgyong province, about 15 miles from the Chinese border.

"This is how we hide from our enemies. Everything in North Korea is underground," said K., who described the cave on condition that he is quoted using only his first initial and that certain identifying details be kept vague.

North Korea is riddled with caves like the one in which K. worked. Under its paranoid regime, virtually everything of military significance is manufactured underground, whether it's buttons for soldiers' uniforms or enriched uranium for nuclear weapons. A South Korean intelligence source estimates North Korea has several hundred large underground factories and more than 10,000 smaller facilities. Joseph S. Bermudez Jr., the author of three books on the North Korean military, puts the total number between 11,000 and 14,000.

Whatever the count, there are enough underground facilities that a popular joke has the country eventually collapsing not from the failure of its communist economic system but from so much burrowing in the dirt.

"The place is like Swiss cheese, there are so many holes," said John Pike, a defence analyst with GlobalSecurity.org, a consulting firm in Alexandria, VA.

North Korea's relentless tunnelling has had a profound effect on the U.S. debate over how to respond to its drive to build nuclear weapons. It makes the option of pre-emptive military action far less viable, because so much of the nuclear program is underground and out of reach.

Even if the Pentagon were to develop nuclear "bunker-busters" — relatively small bombs that penetrate the surface before exploding — the United States would be hard-pressed to use them successfully without knowing which of the thousands of bunkers scattered throughout the country were the correct targets.

The North Koreans began tunnelling after the 1950-53 Korean War, when U.S. bombing destroyed most of their industrial base and infrastructure. North Korea's founder, the late Kim Il Sung, is believed to have been so awed by American air power that he directed key industrial facilities to be built underground.

"The entire nation must be made into a fortress," Kim wrote in 1963. "We must dig ourselves into the ground to protect ourselves." North Korea's mountainous topography, inhospitable for agriculture and transportation, proved to be singularly well suited to the nation becoming what Bermudez calls the "most heavily fortified country in the world." The nation of 22 million people created the fifth-largest army in the world, with the mountains providing natural cover for its military infrastructure.

"We would dig horizontally into the mountains rather than going straight down because we didn't have good technology for waterproofing and we didn't want to run into the water table," said Lim Young Sun, a North Korean defector who worked from 1980 to 1993 in a construction bureau assigned to build underground facilities.

Lim said the North Koreans used mostly Japanese tunnelling techniques, although more modern equipment was later imported from Europe.

In the countryside, small entryways can be seen dug into the sides of many hills, covered with slabs of concrete. "As you travel around and look around, you see that what looked like a regular hill is actually a bunker. It takes a while for your eyes to adjust and to make the mental shift, but after a while, you realize that all of North Korea is an underground facility," said Peter Hayes, who has travelled several times to North Korea and is executive director of the Nautilus Institute, a Berkeley think tank.

Above the demilitarised zone that divides the Korean peninsula, the North Koreans have put an estimated 13,000 heavy artillery pieces into mountain bunkers. The doors face north — the artillery is positioned to quickly slide in and out on rails — so that South Korean and U.S. troops stationed south of the DMZ can't reach them.

North Korean tunnelling activity hasn't stopped at the border. Over the years, four infiltration channels have been discovered in South Korean territory. Based on defector testimony, South Korean investigators believe that as many as 20 more may still be hidden beneath the earth.

The subway system in Pyongyang doubles as a bomb shelter. Some stations in the capital are believed to be as deep as 100 yards underground, with secret tunnels designed to transport the leadership in an emergency.

One tunnel is said to lead north to Pyongyang's international airport, which is believed to have a runway that is largely underground so that an aircraft would not be exposed to hostile fire until the moment its wheels leave the ground. Predictably, official maps of Pyongyang do not show the location of subway stations, and with the exception of two showcase

North Korea's Ace in the Hole

stations, the system is off-limits to foreigners. Because so much happens below the surface, the North Koreans are able to conceal their military infrastructure from the prying eyes of surveillance satellites and aerial reconnaissance. But people and vehicles going in and out of the tunnels can be surveyed, as can utility lines.

When a new facility is built, its size can be estimated by the debris, or tailings, excavated in the process. Exactly what happens inside those installations remains shrouded in mystery, however, making North Korea a far bigger challenge from an intelligence standpoint than Iraq.

"North Korea is the longest-running failure in the history of American intelligence," said Donald P. Gregg, who served as both CIA station chief and U.S. ambassador in Seoul. He cited the difficulty of recruiting reliable spies inside the country and the many underground facilities. "It is simply a much harder place to gather intelligence than Iraq or Iran ever was."

For example, confusion reigns on the question of whether North Korea has, as it claims, extracted plutonium from 8,000 nuclear-reactor fuel rods and, if so, where the reprocessing has taken place — the critical step in producing the fissile material that is the heart of a nuclear bomb.

Until recently, it was assumed that the only possible location was at Yongbyon, a sprawling compound 55 miles north of Pyongyang that has a building six stories high and the length of two football fields designed expressly for plutonium extraction.

United Nations weapons inspectors were expelled from the premises at the end of last year. Now it appears that this imposing building, clearly visible in satellite imagery, might be a decoy. The actual reprocessing could have taken place at undiscovered locations underground.

"I'd be prepared to suggest that Yongbyon is a decoy," said Pike of GlobalSecurity.org. "They don't really need a building the size of several football fields. They could use several buildings the size of tennis courts. Could they hide those? Absolutely. The North Koreans are very annoying that way. What they are trying to hide is small, and they have plenty of places to hide it."

There's even more confusion about the North's production of highly enriched uranium, also used in nuclear warheads. The process requires centrifuges, small devices that are even easier to conceal than the technology used in processing plutonium. The North Koreans asserted in October 2002 that they had a secret uranium program, but U.S. and South Korean intelligence have been unable to determine where.

"Uranium does not give you the same punch for the pound as plutonium, but it has the advantage that it is almost impossible to detect, and you can easily hide it underground," said one U.S. military intelligence official, who requested anonymity. There is a short list of suspected sites for the uranium program, among them underground facilities at Yongjori, about 12 miles from the Chinese border in Yanggang province, and in Chagang province, also in the north.

The facility in Chagang, known as Hagap, has been known to U.S. intelligence since 1996 and suspected of being variously a reprocessing facility, a high-explosives test site or even an underground nuclear reactor. But Daniel Pinkston, a North Korea military analyst for the Center for Nonproliferation Studies in Monterey, Calif., says more recent information suggests that it is merely a vast underground archive for the ruling Korean Workers' Party.

The North Koreans help maintain the extreme secrecy of the underground facilities by keeping personnel virtually locked inside. This is particularly true for facilities that are used for weapons of mass destruction.

"Once you go in, you don't go out," said K., the North Korean who worked at the Musan County facility until, through a combination of bribery, guile and family connections, he escaped in 1996. "I volunteered for this, but then I came to realize that it was like a big prison and we were slaves."

K. was assigned to work for the 2nd Economic Committee of the National Defence Commission, which despite its innocuously bureaucratic name is the organization believed to be responsible for producing weapons of mass destruction. He said he was selected for the elite unit because his father also was in the military and his family was considered loyal to the regime.

At the time he was sworn in, he took an oath promising to work there until age 60. In nine years, he left only once — handing over a bribe so he could visit his family at home. Others could see relatives only at a reception area outside the facility, where visits were supervised.

Had he remained, K. said, he would have been expected to find a wife among the women assigned to his unit and to raise a family within the compound, which had schools, canteens and other facilities to keep employees relatively content for life. Most of the staff facilities were within the compound but above ground, and visible. K. said male recruits generally married after 10 years of military service, while women became eligible for marriage at age 24.

So complete was the secrecy that even employees inside had little idea of what was being produced. "Some people said it was for chemical weapons. But everything was wrapped tightly with zinc so that we never really knew what was inside," K. said. "We weren't supposed to ask questions. We weren't supposed to wander around."

K.'s account is corroborated by the testimony of other defectors, who speak of secret military sites where the staff is virtually imprisoned.

"In these places, people have a lot of privileges.

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There is no problem with food and there are good schools, but they are like concentration camps too. You live in secrecy under constant suspicion," defector Lim said. "This is what happens if you volunteer for the chemical, nuclear or missile units."

The North Koreans' talent for concealment complicates efforts to forge a diplomatic solution to the current nuclear standoff. On Oct. 19, President Bush announced in Bangkok, Thailand, where he was attending a summit of Asian-Pacific leaders, that he would consider giving North Korea a written guarantee that the United States won't attack if Pyongyang verifiably and irreversibly dismantled its nuclear program. But how is complete verification possible when so much is hidden underground? "Unless you are prepared to invade and occupy the whole country, you might never be able to find what you're looking for," said Pinkston of the Centre for Non-proliferation Studies.

There is a precedent for inspecting North Korea's underground facilities that could be taken as a cautionary tale. In 1999, the United States demanded access to an excavation site called Kumchangri that was so large, it could accommodate an underground reactor and reprocessing plant. North Korea demanded $300 million in return — which it received in the form of 600,000 tons of food aid from the United States and South Korea.

The team that conducted the inspection found the facility surrounded by thousands of North Korean soldiers, some doing kung fu exercises, others manning machine-gun nests at the entrance to the tunnel, according to Joel S. Wit, who headed the inspection team for the State Department.

"It was a little bit surreal," Wit said. "It looked like the set of a World War II movie."

What the inspectors did not find, however, was any evidence of nuclear weapons production despite a thorough scouring of the premises and sophisticated air and soil sampling. They left joking bitterly that the underground complex might be used instead as a mushroom farm or vast wine cellar for the private stock of North Korean leaders.

"We provided that food aid for nothing," said a South Korean security official, who asked not to be named. "We were all duped by the North Koreans."

Barbara Demick, Los Angeles Times 14/11/2003

Remember the Alamo!

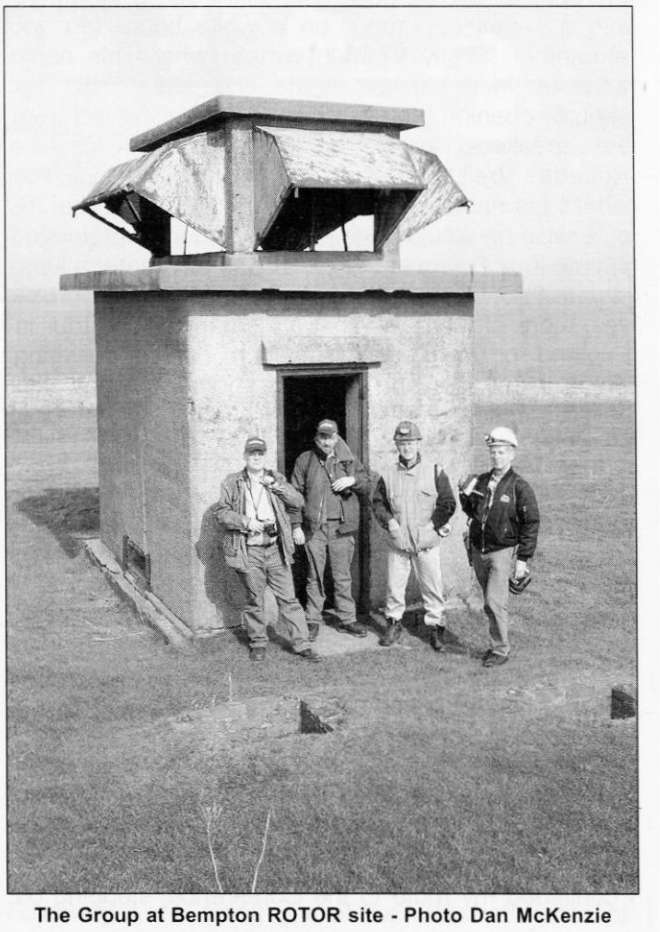
In the course of thousand of years of history a number of rallying calls, sayings and the like have made their mark and will probably remain with us for as long as we can read and write. You only have to think of "Remember the Alamo!", "Vinceremos!", "Get off my f----- foot!" to name but four. (OK, so you're awake and still with me!).

A few years ago a new expression entered this exalted list: "Never again!", which was uttered in a weak, trembling voice as two mini-buses pulled away from a bunker site somewhere in eastern Germany and transported a bunch of deranged individuals back to their cells in the UK.

As a chronicler of the times, I have the honour to report that yet a further expression has now joined these memorable calls: "Nie wieder!" (pronounced with a suitable Teutonic accent along the lines of: "knee veeda" and said with an expression of exasperation, exhaustion and frustration, all deeply engrained on one's face.

Yes, I've been at it again, this time with a bunch of Teuts, rampaging with them though the wilds of north and middle England - well, north of the Thames anyway.

Like all such events, it started when my brain was not switched on and I was feeling benevolent to the world (it does happen, but rarely). A hulking great individual of SubBrit threatened me with a once-over if I didn't deliver some kind of lecture at a forthcoming conference on the subject of bunkers and other



The Group at Bempton ROTOR site - Photo Dan McKenzie

Remember the Alamo!

lumps of concrete which had been left behind by the red hordes in their haste to get back to their beloved motherland.

Some months later and countless sleepless nights the result was finally delivered at the 2004 Spring Conference of the aforesaid SubBrit organisation, which had been organised by the HGI (go on, work it out for yourselves!) - obviously a man of many talents. After one day's rest, i.e. visiting five bunkers in the space of four hours, I moved off to Stansted to await the arrival of the Teuts' bomber, sorry aircraft. But how did they get in on the act, you may well ask. Well, ...

Some months earlier while I was slaving away day and night, preparing the contents of the lecture, I happened to mention to one of my bunker friends over here in Teutland what I had been drawn into. "Sounds great to me", he said. "That means you'll be able to do a quick tour of the bunkers over there for us afterwards". Funnily enough, this idea hadn't struck me until then, but it soon began to take on frighteningly solid directions, reinforced by repeated questions at regular intervals as to how the tour planning was progressing.

Fortunately, the deranged ones had been let out on good behaviour again and a raiding party made its thirtieth or thirty first trip to the former socialist empire training grounds. There must have been something in the beer or the air as one of them suddenly turned into a knight in armour on a white horse (do you remember "Pretty Woman" where what's his name turns up in a big car at the end, standing in the sunroof opening, some opera music belting out from the speakers, as he holds out flowers to Julia Roberts? Well, my knight in armour didn't look like what's his name, and he certainly didn't look like JR, otherwise he would have been invited for a prolonged private tour, however the effect was the same: a lump in your throat as he uttered those memorable words - yes, more of them - "What if I organised the tour in England for you?"). I have seldom been a quivering wreck in my life, but there are moments when you have to loosen off the braces on your trousers. All of a sudden, the world seemed a lovely place!

It was now my turn to ask at frequent intervals: "How's the tour going?" and to hear the travel rep from Peterborough squirming out excuses at the other end of the phone. But, to give the man his due, just before I was due to depart to the UK there was a complete programme for the five days , a route card 54 pages long, which gave me turning instructions for every 30 metres (or big yards for you lot) along the route tucked away in my file. I consequently set off from my des res in the south of Teutland to meet up with the route which the red hordes and their allies would have taken on their way to the French coast so they could hop over the Channel to sample a full English breakfast.

I continued my route to the Conference, stopping off at every possible SubBritter's house who had ever been on a bunker tour of mine - my goodness, they were going to pay for it one way or another! After a one-nighter in a beer bottle in Kent, I moved on up to the Wild West of London, where HGI had to put up with me / had to put me up for two nights (that'll serve 'im!) and finally on to the P'boro travel rep, where I immediately felt at home: where else would you find a Russian GAZ 66 parked outside the front door. Once inside the airlock, it was, in fact, very English, well for P'boro standards.

Up until now everything had gone smoothly: the lectures seemed to have gone down well after I had picked the lock to get at the audio-visual gear (you pick up a lot of useful skills in the Army), I'd had a good lunch on the house (always go for the highest priced dish, regardless of what it is), had lots of chats in English (rare opportunity) and had been driven around to see some bunkers. The world loved me!

Sitting at the breakfast table several hours before the crack of dawn with the P'boro rep opposite you (not a pretty sight at that time of the morning, I can assure you: Julia Roberts would certainly have been the better option), I realised that my days of leisure were over - I was off to Stansted to meet the red-eye flight.

Having worked through the 14 pages of the route card for the Peterborough - Stansted stretch, I found myself in the lounge, enjoying my final seconds of freedom. Punctually ten minutes late, the Teuts came through the gate and extensive beams spread across their faces as they realised they were a) at the right airport, and b) they had been met. At this stage, I should point out that only one had ever been outside of Germany before, one was terrified of what he might be forced to eat over the next week (as was his mother), and they had all expressed fears about driving on the wrong side of the road. Yes, I know, pathetic, but you must consider the nationality: these were the remnants of the master race after all: played two, lost two, and both were home games. I gather they weren't so hot on football either.

I had attempted to point out, like in capital letters and a loud voice on several occasions, that it was me who was doing the driving, they would be getting nowhere near my steering wheel, and hands off me gear lever, and finally, being British, we were used to invading (successfully) most countries and had experience in driving in lots of pokey holes all over the place (including Germany), so a simple switch from the continent to the UK or vice versa was normally left to the youngest member of the mobile home so that he could gain a bit of confidence behind the wheel of his dad's car before moving on to a tank or missile launcher.

Having sacrificed my week's pension to get us out of the Stansted car park, we hit the road. I think we had managed about 20 metres before a great cry came from the back of the car as we entered the first roundabout: "Scheisse, bandits at 3 o'clock!". Once

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we had cleaned up the mess in the car and the unfortunate had changed his trousers, I pointed out that I would have been saying "Scheisse" if "they" had been coming from the left and that it would be beneficial to us all and for the week if they would kindly keep their eyes and ears open and their mouths shut.

Our first target, sorry, visit was Drakelow. Despite travelling at slightly below the speed of light, we were falling behind schedule following a 45 minute wait on the M 42 to admire the delights of Birmingham and the rear end of the car in front. We negotiated the lanes on the final approach (sorry, the terminology just keeps popping up) with burning rubber and slammed off the road into the obvious entrance, which it wasn't. However, as soon as I stopped to look at the map, all three baled out and proceeded to water the flowers, which I found very touching as I hadn't been aware until then that they were interested in horticulture. With a tap, you just need to twist it a little and the flow stops. However, Nature has boobed again and there is no emergency shutdown system on the male body. Consequently, when the police car pulled in right behind us with its cargo of a copper and a wpc, there was a great deal of do-it-yourself fumbling on the German front.

I explained to the police that the three were foreigners, so the matter went no further. The patrol car subsequently guided us up the road right into the car park of Drakelow, much to Paul Stokes' amusement. As our friends and helpers moved off, the wpc gave us a wave and I shouted across to her quite naturally: "Thanks, love". As a matter of cultural etiquette I pointed out to the three Teuts, that if they tried the same thing in Germany with Brunhilde in uniform along the lines of "Danke, Schatzi", they would probably be fined on the spot for "offending a civil servant" - yup, they are all civil servants over here and are generally thought of as your "friend and helper" only with the tongue planted firmly in one's cheek. Anyway, enough of this nonsense.

Paul did us proud and we had a look in every nook and cranny that was going. We've been to several underground factories in Germany so we were able to see the striking similarities: they were both deep underground.

A quick rev up the motorway and we were soon at Rod Siebert's cottage at Hack Green. I had already briefed the three musketeers on Rotor, RSG, RGHQ, RQSG, ROC, AROA, WUKMO and other such contagious abbreviations, so they were fully au fait with the descriptions of the bunker's history. Rod has packed the museum full with a wide range of goodies so I was able to leave the children to play on their own while I had a cuppa. As a special treat, we were also taken out to the radar array, where Rod wound the spring up and set it in motion. Very impressive, including the sound effects: you can practically hear the current surging along the cables (or is it the meter spinning?).

York ROC Group HQ- The Group receive a brief - Photo Dan McKenzie

We overnighted at a Travel Inn just up the road and since they survived the evening meal they were rewarded with a full "all on" English breakfast the next morning. All plates were wiped clean with toast to remove every single last trace of HP sauce - one cachet had actually been emptied onto an empty plate just so that it could be subsequently wiped off to be fully savoured.

Tuesday saw us visiting the vets' surgery at Goosnargh, where they had kindly opened up the UK ROC HQ earlier to let the air circulate a little. In the course of the week we were going to see the whole range of ROC facilities - all I had to do was to put them in at the appropriate level in my descriptions cadged from Nick's site reports. As at Hack Green, we were left on our own, which is always a tremendous advantage.

Following a trip along one of the nicest stretches of

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motorway scenically, i.e. between Manchester and Leeds, with historical and geographical titbits being casually dropped into the conversation, we arrived at the AAOR in Leeds to discover that the fire brigade didn't know they had it there. The Peterboro rep had joined us by know, so after we had convinced them that they had it tucked away as their comms centre, we thought we'd leave that one out and went on instead to the war room. This again had been opened up for airing, so once we had booked in at security, we donned our hard hats, gear and strolled confidently past numerous office windows where 16 and 17 year old typists gawped in awe at so much manliness walking past. This site was really hard going, not only because of the girls, but also due to the fact that it was under about an inch of water.

Yes, OK, have a good laugh, but there is a point to all of this rubbish: just before coming across I had briefed my thugs about what to wear (hard hat, boots, waterproof knickers and the like), and yet here we were standing at the edge of unknown depths of water with one member of the party in shiny white plimsolls, looking a right prune. He remained looking a prune, but one with dry shoes.

We overnighted in the area and went for a typical English meal: a curry. And very good it was too, and enjoyed by everyone (the moans about food had disappeared by now, although the cries of warning every time I approached a roundabout continued to irritate my delicate soul right up until the end).

Dan guided us in to York the next morning where a whole parade of people were lined up: Roger Thomas from English Heritage, the last commandant of the ROC/UKWMO HQ we were visiting together with his deputy, Helen, the site manager (she's running three building site projects and all three have major problems), and lots of bodies who just seemed to hang around in the background and talk to each other as we moved around the site (minders? one asks oneself). The commandant and his deputy were obviously in their element and were able to explain every screw (as it were) in the place. From a site being lovingly and tenderly restored to its former glory, we moved on to Bempton. Here we were truly puzzled since we were unable to fathom what loads of cow muck would have been used for in an R 1 Rotor bunker in wartime: perhaps, as in India, it was dried out on the walls and provided fuel for the resident artist as he went about his work. Who knows?! Another of life's small mysteries.

We then bombed down south via the 'ull bridge - all suitably impressed - and spent another night in a Travel Inn. leaving Dan to tinker with his Gaz. The next morning, this is Thursday now in case you haven't been keeping awake, we drove a short distance to RAF Alconbury, where we were welcomed by John, the site manager, treated to coffee and a sit around the conference table to hear the history of the site before moving out to explore everything. Impressive is the word, I think. The size of the HAS (read the site report if you don't know what it means, what are you in SubBrit for, for goodness sake!), the finish in the various facilities and, of course, the Magic Mountain. Need I say more? Yes, but I won't. An excellent visit, which really impressed the Teuts.

During the course of the week one or two little irritants had gradually been surfacing, like on Monday morning when we set off from the airport. I mentioned earlier about the red hordes wanting to get to an English breakfast in seven days. One thing I know for sure: their East German allies would not have been with them as the map reading skills demonstrated in the car en route left a lot to be desired. Dan's printout was available, a marked up car atlas, pen sketches for the last two kilometres (a big mile), etc. Could they guide me in at speed. could they bakery! (I think my English is slipping). Goodness knows where their missiles would have landed, probably in Poland. Anyway, we came into London at high speed with me driving and using the A to Z to read off the roads and finally hit Dollis Hill underground station.

Here Nick met us and we travelled by tube (suitably impressed, they were, so stop moaning about it over there) and went on to take a look at the BBC bunker. After chatting up the receptionist we met Robin Cherry and were taken into every open room by Mike Todd, the duty broadcast manager who has also written a history of the site, so we were in good hands. After declining a cuppa due to lack of time, we dashed off back to the underground to savour the rush-hour, followed by a short trip on the bus to get to the Admiralty Carpet Store, sorry Admiralty Citadel, cunningly concealed beneath a carpet store. I gather the carpets would have cushioned any bombs that might have landed, but perhaps there's a few more details on Nick's page. Take a look!

An intriguing concrete block sits in the bunker itself with an entrance fit for one of the seven dwarves, so perhaps the Navy had a secret weapon which has still not been written about. However, we could recognise that the site was a naval one since the floor was under water (plimsolls outside, please!). What I hadn't realised was that Paddock had also been in naval hands since this was also acting as an emergency water tank until Nick did a natty dance with a squeegee and triggered the sump pump. Since Nick held the key here we had no rush to get out (we were actually encouraged to go at the carpet store), as well as having a guide who knew what he was talking about: he'd obviously read up the text on the website.

Brilliant map reading lead us (eventually) to the Holiday Inn, where we adjourned to the eighth floor to enjoy a magnificent view over north London in the rain. As I was negotiating several roundabouts, lane changes, etc. in the rush hour on the approach to the Holiday Inn I was shaken out of my reverie

Remember the Alamo!

(numbness?) by a question from the backseat of the car as to where I was taking them to in London that evening since we were so close in and it would be nice to see the sights. I pointed out in my subtle way that I was going nowhere, that this wasn't a holiday tour, but a bunker tour, that I had already rejected a suggestion to squeeze in a trip to Stratford upon between two bunker visits, but if they wanted to go, it was no problem for me to stay on my own in the hotel.

We passed an enjoyable evening together over the meal and discussing the next day.

Pinpoint map reading brought us again to within five miles of the target, but we found the Belsize Park deep-level shelter just round the corner, so having paid for the bit of real estate under the car we went there to discover that Nick had also obviously got lost since he was there as well and he kindly offered to guide us around. We were all duly impressed by the blue-eyed god in the shape of the mercury-arc rectifier, throbbing away in its corner and by the thousands of boxes of files which now occupied the beds on the walls. It's the kind of place where you could get lost quite easily and become one of the stored items, except that you wouldn't have a box until they had found you months later.

The Group at a very wet RAF Alconbury- Photo Dan McKenzie

We were escorted away by an imposing gentleman on a motorbike as we drove through the streets of London to the wilds of Billericay (I thought it was in Ireland for years, but since we didn't cross any water, it can't be). Here we met up again with Robin Cherry and our motorbike escort turned out to be Nick, who then showed us around one des res.

We were obviously becoming known to the authorities as we then had a car up front and a motor bike escorting us from behind. We gave a royal wave to several people on the pavements as we drove past and splashed water over them, but no one seemed to take any notice of us. Peasants!

However, we were given the treatment at Kelvedon Hatch. First of all, it bucketed down, but by then we were inside and the roof just about managed to keep the rain out. Secondly, Mike Parrish gave us the run of the place and very kindly refused to accept any payment either for the tour, food or the various brochures and badges which the tourists with me had picked up. I was actually urinated off at this point as I quite fancied a couple of Soviet badges myself, but had been so busy interpreting for the mob that I had no time to get my hands on anything. Consequently, my breeding made it difficult for me to pick up a whole box of goodies after Mike had said that we needn't pay for anything.

And then it was OVER!!!!!

I told the three to get their bags sorted out while we were still on the KH car park as my car had started to look like a second-hand shop crossed with Oxfam in the early days. I would take them directly to the pavement area at the departure area at Stansted, but I did not wish to hang about. In fact, I had them out of the car, luggage on the pavement and was disappearing into the distance, leaving them in a cloud of burning rubber (wheelies with a Volvo estate are very impressive) in just under 20 seconds.

Before I had even reached the first roundabout, an inane grin was spreading over my face despite the fact that I still had some eleven hours of driving before I reached chez moi.

Acknowledgements

My very sincere thanks to Andrew, Dan, Mark, Nick, Richard, Robin, and Wayne for setting it all up and to the site owners, administrators, etc. who let this mad bunch into the various facilities, in particular Paul Stokes, Rod Siebert, Roger Thomas and Mike Parrish. You're a great bunch!

If there's anyone I've forgotten, tough! But many thanks to you as well.

Author's note

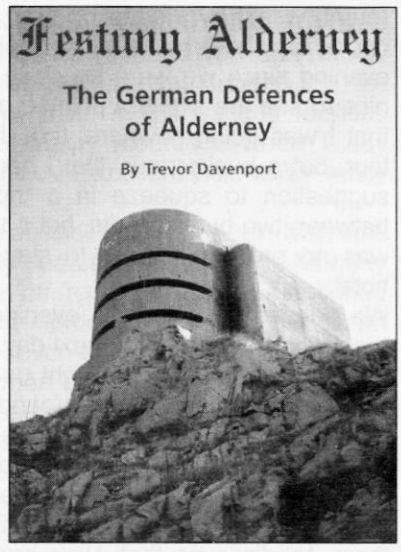
This is a personal view of the tour and any relationship to the truth is purely coincidental. I have not dwelt in depth on the individual sites since they are all extremely well described on the various SubBrit pages.

And a final piece of advice: Organising a tour can endanger your heath: the Government advises you not to do it.

Herr Mike Barton

Festung Alderney –The German Defence of Alderney

A new book by Trevor Davenport Published October 3rd 2003.
Alderney, third largest of the Channel Islands and lying seven miles from the coast of Normandy, possesses one of the finest concentrations of 19th and 20th century military architecture in north-west Europe. During the Second World War, the Germans invaded the Channel Islands after the fall of France in 1940. The occupation and subsequent fortification of the Islands has always been considered to be due to Adolf Hitler's personal obsession with the possession of British soil.
Eventually they were to become one of the most heavily fortified sections of the Atlantic Wall and by 1944, with an allied invasion imminent, were designated as one of twelve 'Fortresses' that were to be defended to the last man. Although far smaller than either Jersey or Guernsey, Alderney was fortified to a greater degree, for its size, than the other islands, having thirteen infantry strong points and twelve resistance nests, five coastal batteries, twenty-two anti-aircraft batteries, three defence lines and over 30,000 landmines.
Using aerial photo-reconnaissance photographs taken by 542 Squadron within days of the German surrender in May 1945, the author has produced a series of line drawings of every battery or infantry strongpoint in Alderney. Each German position is described noting the surviving emplacements. Also included are maps of the minefields, tunnels and underground telephone system together with plans of all the fortress standard bunkers in the island and their distribution. The 196 page large format book is profusely illustrated with 10 maps, more than 50 plans and 250 photographs (90 colour). A definitive and meticulously researched book.



This Fantastic book can be ordered the Editor. Please send a cheque, Made Payable to "**Trevor Davenport**" for £17.50 + £3.50 Postage and Packing to Dan McKenzie, 53 Home Pasture, Werrington, Peterborough PE4 5AY. I will collect the orders and send them direct to Trevor Davenport.

The Great Stink of London

Sir Joseph Bazalgette and the cleansing of the Victorian metropolis by Stephen Halliday Published by Sutton ISBN 0 7509 2580 9 £10.00
It's hard to fault history told with a good narrative style, and this book is one of the best pieces of historical storytelling I have read. The book charts the problems caused by London's growth as the city's cess-pits were passed over in favour of sewers (read rivers) draining into the Thames. Some of the account is a little grotesque but it's hard to imagine how anyone tolerated sanitation levels as they stood before Mr Bazalgette finally got his plans approved; never mind the cholera, the smell must have been unspeakable as raw sewage just washed up and down on the tides.
It should also be noted that his plans were only approved, after the collapse of no less than five previous Royal Commissions. And only then by a government that had been forced out of its chambers in the House of Commons by the overpowering stench cooked up from the Thames in the sweltering summer of 1858.
Stephen Halliday clearly loves his subject (engineering history that is) and the book is all the more readable for it. His pen portraits of the main characters involved have a hint of Dickens about them – such as the spiky Sir Edwin Chadwick, a man so abrasive that he personally caused to dissolution of two of the commissions as they descended into acrimonious farce.
The style is good, but it's equalled by the content which explains not only what happened when, but why, and even provides the social context for the decisions made.
The greatest wonder on finishing this book, however, is how on earth and English engineer of such standing and prolific output can have been overlooked by history for so long?
Bazalgette was not only an engineering titan (the referees on his CV were Robert Stephenson, Sir William Cubitt and Isambard Kingdom Brunel himself) but he probably saved more lives than any other figure in Victorian public life.
He also worked at ten to the dozen. He built the embankments that tamed the Thames; many of the great thoroughfares, parks and bridges that define the look of the modern city; and the astonishing network of tunnels and works that vanish away the filth of London to this day.

From John Smiles

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